

NOW, A TINY SATELLITE "DISH" FOR EVERYONE

Home Satellite **TV**

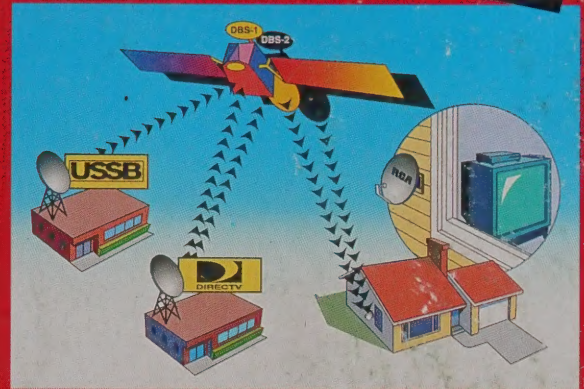
Winter 1994

New Direct Broadcast Satellites

YOU CAN RECEIVE UP TO

**150 Channels
... NO CABLE!**

**WHAT YOU SHOULD KNOW BEFORE
BUYING YOUR OWN SATELLITE RECEIVER**



NEW NETWORKS IN THE SKY

**NEW SATELLITES
SO POWERFUL THAT
YOU NEED ONLY THIS**

18 INCH
"DISH"



\$3.50

©



44 >

0 09281 02052 3

**GET THE
BIGGEST HITS ON
THE SMALLEST DISH.SM
ONLY WITH USSB.**



When you have the new RCA® Digital Satellite System™ with its incredible 18" dish, you'll definitely want to subscribe to USSB (United States Satellite Broadcasting).

Because with USSB you get more choice and more variety. Every time you sit down to enjoy a movie, you get 14 distinctly different premium channels to

choose from—5 HBO channels, 3 Showtime channels, 2 channels of The Movie Channel, 3 Cinemax channels and FLIX – *plus* six of the most popular basic channels.

For more details, call now: 1-800-204-USSB



USSB
EXPERIENCE DIGITAL ENTERTAINMENT™

DSS* is an official trademark of DirecTV, Inc., a unit of GM Hughes Electronics.
©1994, United States Satellite Broadcasting, Inc. All information subject to change. HBO and Cinemax are registered trademarks of Time Warner Entertainment Company, LP. Showtime, The Movie Channel, and FLIX are service marks of Showtime Networks, Inc. MTV: Music Television, Nickelodeon/Nick At Nite,

and VH-1/Video Hits One are registered trademarks of MTV Networks, a division of Viacom International Inc. All News Channel is a trademark of Conus Communications and Viacom, Inc. Comedy Central is a registered trademark of Comedy Partners.

No usable south facing wall ? ? ?



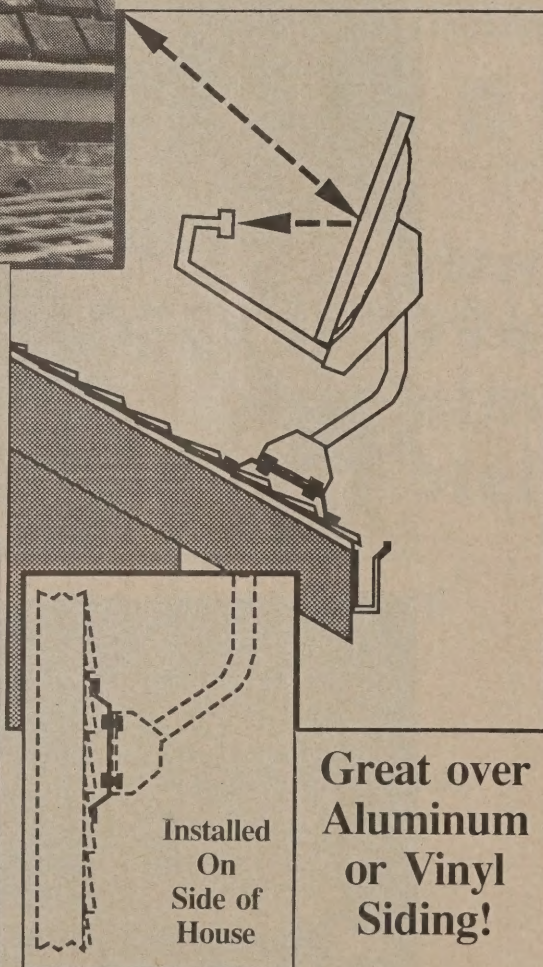
Big-Foot,TM The Perfect Solution!

Ideal for backyard eave installations where dish has a clear satellite look angle from any direction, but, the dish remains out-of-the-way, and out-of-sight!

Big-Foot's unique design provides a strong, ridged mounting foot over any uneven surface by bridging over two adjacent support studs.

- Ideal for shake, shingle or metal roofs
- Perfect for aluminum or vinyl siding and stucco walls
- Great for mounting on RVs
- Pre-drilled for standard 16" and 24" roof or wall stud spacing for fast, easy installation

Big-FootTM ... The Perfect Solution!



**Great over
Aluminum
or Vinyl
Siding!**

Big-FootTM

DSS mounting bracket

Satellite Service Inc. • Sunnyvale CA
(408) 749-8212

Patent Pending—All rights reserved ©1994 Satellite Service Inc.



Available wherever

DSS
DIGITAL SATELLITE SYSTEM

from RCA is sold.

Suggested retail price is just \$29.00

Consult your local satellite professional.

DIRECTV and DSS are official trademarks of BM Hughes Electronics. © 1994 DIRECTV Inc.

Home Satellite TV

Winter
1994
Volume 3, Number 1

Miller
Magazines, Inc.

PRINTED IN U.S.A.



BOB WOLENIK Editor; **BONNIE-JANE MASON** Associate Editor; **TONY GOMEZ, CARL SANCHEZ** Contributing Editors; **LLOYD COVENS** Advertising Director; **BILL REID** Art Director; **CELESTE WEINGARDT** Advertising Production; **DEBBIE CARTER, LYNN THOMPSON** Typography

JAMES L. MILLER Publisher
KAREY MILLER Associate Publisher

HOME SATELLITE TV is published by MILLER MAGAZINES, INC. Executive, editorial, advertising and circulation offices, 4880 Market St., Ventura, CA 93003-7783, telephone (805) 644-3824. Single-copy price \$3.50. We accept no responsibility for loss or damage to unsolicited editorial contributions. Printed in U.S.A. Copyright 1994 by MILLER MAGAZINES, INC.

Cover photo by David Jay Lans

150 Channels ... NO CABLE!

The Satellite Revolution of 1994

8

Install It Yourself

The Easy DSS Hookup

by Robert Irwin & Tony Gomez

18

DSS Buyer's Guide

Finding Your Local DSS Contact

by Lloyd Covens

24

Launching The "Birds"

The Super Technology Of Satellites

by Robert Oakes

26

All Those Channels

Channel Choices You've Never Imagined

by Lloyd Covens

30

What You Can Receive

Two Distinct Programming Sources

by Tony Gomez

34

The Home Satellite Revolution

From TV Antennas To Small Dishes

by J.K. Dormer

46

Live From Castle Rock

Where The Programming Begins

by Tony Gomez

50

DSS Facts

Your Choices In Hardware

52

How It All Began

History Of The Satellite Revolution

by Bob Cooper, Jr.

54

Satellites To Home Theater

Superior Signals Warrant Upgrading

by Carl Sanchez

58

Accessorizing Your Dish

Add-Ons To Improve Your Satellite System

62

The Home Satellite Story

Great Technology In A Nutshell

66

The C-Band Alternative

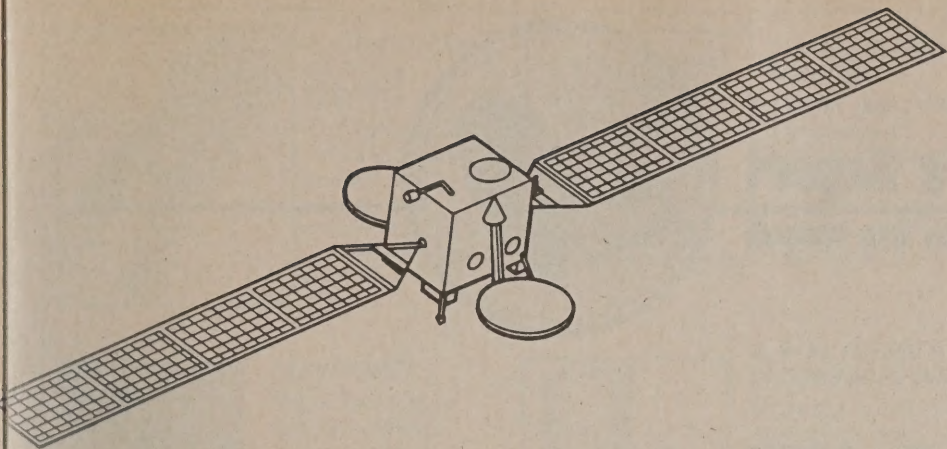
The Big Dishes Still Give You More

68

PRIMESTAR Strikes First

An Alternative, Smaller-Dish System

76



DBS 95

Dec. 2, 1994 • Anaheim, CA

The First Million

Companies Profiled:

- B SkyB
- Cablevision/Continental
- EchoStar Corp.
- General Instrument
- Hughes/DirecTV
- NewsDatacom/NTL
- PrimeStar Partners
- Star-TV/Murdoch
- TeleCommunications Inc.
- Thomson Consumer/RCA
- Time Warner
- USSB-Hubbard Broadcasting

2.5 meter C-band
1 meter Prime
5 meter DSS

**Friday
DEC. 2, 1994
Anaheim
Marriott Hotel**

Who Should Attend DBS '94?

- Programmer's
- Satellite and Pay TV Companies
- Cable Operators and MSO's
- Consumer Electronics Retailers
- Financial Institutions
- Equipment Manufacturers and Distributors
- Telecommunications Advisers
- Telecommunications Operators

**FOR MORE INFORMATION
CALL 719-545-1986 FAX 303-797-7201**

Editor's Report

by Bob Wolenik



A Promise Fulfilled

We here in the good old U.S.A. like to think that, even if other countries can build better and cheaper products than we (cars from Japan and Germany, electronics from Singapore and Taiwan, clothing from China, and so on), there are no more-knowledgeable consumers on the face of the planet than Americans. We may not build it, but we buy it. Right?

Think again. Most of the world scoffs at American consumers who they see as willing to accept inferior, old-fashioned technologies. Consider consumer electronics.

In Japan, Sony and Matsushita (Panasonic here in the U.S.) offer higher-resolution television sets than in the U.S. They, and other manufacturers, offer camcorders to the public that don't reach us until a year or two later. (Canon, for example, has a camcorder only in Japan, called the Movie Boy, that senses where the viewer's eye is looking in order to automatically focus the lens!) Even their VCRs are years ahead of anything we could find on American store shelves. In short, consumers in Japan have access to hundreds of electronic items that we might only dream about.

This holds true for television delivery as well, and not just in Japan. In Italy and England (remember old-fashioned, 19th-century industrial Great Britain?), tiny home satellite receivers have been the rule for years, nearly a decade in some cases. Check out any apartment building in either of these countries and, chances are, on them you'll see tiny satellite dishes receiving scores of channels ... with no cable lines. Indeed, most of the world regards the idea of stringing television reception wires to houses as environmentally unsound and technically antiquated. (In most of the world, people don't even know what a cable company is!)

But not here in America. The cable companies, which have been stringing us all together for nearly two decades, are the strongest single force in video communications.

And we Americans, while berating the costs and the uncertain service of cable, have figured that at

least it's giving us a clearer signal over the wires than we could get over the air.


... Until now, that is. Finally, within the last few months, we've begun to catch up. Finally, here in the U.S. it's becoming possible to receive excellent television without having an "umbilical cord" strung to the cable company. The promise of true wireless television presented to us as early as the 1940s, has come to pass. At last, we have true direct-broadcast satellite TV.

The new Digital Satellite System (DSS), described throughout this magazine is a revolution for America. It's not perfect, but it promises to bring us into the Video and Communications Age.

Of course, DSS doesn't do everything. For example, because of an little-known act of Congress (sponsored by you know who) back in 1988, called the Satellite Home Viewing Act, the satellite companies cannot compete with cable to bring you broadcasts from local television stations. Unfortunately, that includes the three major networks. You still need cable, or a conventional antenna for these.

On the other hand, the promise is there. Your DSS receiver is individually addressable from satellite! This means that you can not only get the latest pay-per-view movies for only a few bucks, but soon you'll be able to interact directly for games, information and other services. This feature, though not yet activated, is already built into DSS boxes. That's why I say that the satellite service is more than just video, it's part of the communications revolution.

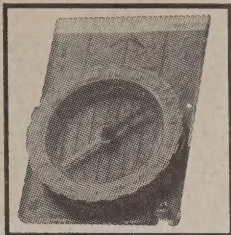
But don't let me spoil it for you. Throughout the pages of this issue of *Home Satellite TV* we endeavor to answer every question you may have about the satellite services: How do they work? How much do they cost? Where do you get one? How good are they? Are they for you? And a host more.

Finally, with the bold launching of Direct Broadcast Satellite through the DSS system, the promise of great viewing and great communications is being fulfilled for all of us. Don't you be the one to miss out. 



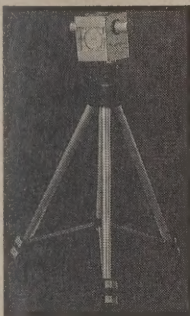
1. COAXIAL CABLE CUTTER & STRIPPER

This lightweight tool cuts and strips coaxial cable to prepare it for fittings. Adjustable to fit RG-58, RG-59 and RG-6 coax. \$26.



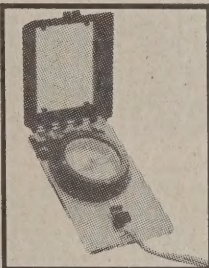
2. SILVA POLARIS COMPASS

Lifetime guaranteed compass with magnetized Swedish steel needle, sapphire bearing. Dial reads in 2° increments. \$17.



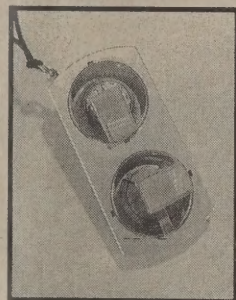
3. BIRD FINDER

The perfect tool for sighting satellites. Built-in compass and inclinometer on sturdy tripod. Aluminum construction - 36 oz. \$174



4. SILVA COMPASS/INCLINOMETER #15CL

Compass & inclinometer in one, with sighting mirror for 1° accuracy. Has rotating capsule, sight line and adjusting screw for declination readings. Azimuth and quadrant scale. \$59



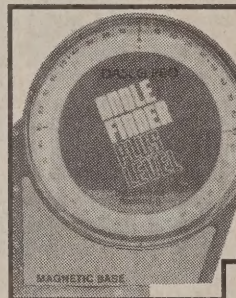
4A. TWIN SUNTO COMPASS/INCLINOMETER

Sight through or prism views for measurements of both azimuth and elevation angles. Jewel bearing with accuracy to 0.25°. Threaded tripod socket. Clinometer scales in degrees or percentages. \$155



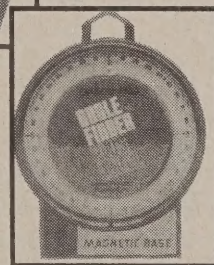
5. DIGITAL COMPASS

Works as easily as point-click-read. Has pistol sights, information display, memory and timer control, and bearing trigger. Memory holds 9-bearings. \$167



6. ANGLE FINDER (LARGE)

Level with magnetic base to measure angles from 0 to 90 degrees easily and accurately in any quadrant. \$23



7. ANGLE FINDER (SMALL)

Accurate to 0.5° Easy, accurate reading from 0° to 90°. \$20

ORDERING INSTRUCTIONS for TOOLS

BAYLIN PUBLICATIONS

1905 Mariposa
Boulder Colorado 80302 USA
Telephone: 303-449-4551
FAX: 303-939-8720

SHIPPING INSTRUCTIONS

to UNITED STATES:

Add \$4.00 for each item ordered. UPS regular, 2nd day or overnight may be requested at additional charge; add \$4.75 extra for COD. MasterCard, Visa and Amex cards accepted.

to CANADA:

Add \$5.00 per item ordered. Please remit funds in U.S. \$ or by credit card. Orders are shipped via book rate mail, UPS shipping can be requested, but no COD is available to Canada.

Payment Method

Check Enclosed ☐
Cash ☐
Credit Card ☐
COD ☐

Shipping Method

Air ☐
Surface ☐

Total Shipping \$ _____

ORDER TODAY (Quantity Discounts Available)

1. COAXIAL CABLE CUTTER & STRIPPER	\$26.00
2. SILVA POLARIS COMPASS	17.00
3. BIRDFINDER	174.00
4. SILVA COMPASS/INCLINOMETER - #15CL	59.00
4A.TWIN SUNTO COMPASS/INCLINOMETER	155.00
5. DIGITAL COMPASS	167.00
6. ANGLE FINDER (Large)	23.00
7. ANGLE FINDER (Small)	20.00
Miniature Satellite Dishes - The New Digital TV	20.00
Sub Total	
Sales Tax (Colorado Residents only - 3.7%)	
Shipping (see left for detailed costs)	
Grand Total	

Name _____ Telephone _____

Company _____ FAX _____

Address _____ Credit Card No _____ Exp. _____

Signature _____

150 Channels... NO CABLE!

How The Satellite Revolution Of 1994 Will Change Your TV Viewing

It's here at last—a cable-free system capable of receiving 150 channels of programming ... every show you ever wanted to watch, and dozens more you've never even heard of! And there's no cable company hookup, no cable company bills. All it takes is a small, foot-and-a-half "dish" that you can hang on an outside wall, place on your roof or mount on a fence. There's no catch. You *can* cut the cable wires!

What is it? How does it work? How much does it cost? Where do I get it? We'll answer all of these questions. But let's start at the beginning.

Over-The-Air

At first there was only over-the-air, broadcast TV. You remember over-the-air. It's where there's a television station in the heart of the city and a transmitting tower, usually located on a nearby hill or tall

building. To receive the signal, you needed an antenna on your house. If you were close by, a set of "rabbit ears" would work. But if you were a long way from the tower, as most of us were, you needed an antenna on the roof, sometimes a very *big* antenna that rotated to get the signals sent from different stations with towers located on other hills.

There's nothing wrong with over-the-air, broadcast TV. In fact, it's terrific because it's free. Of course, the selection is sometimes limited—in most markets, usually consisting of just the networks and some independents. And then there was the reception. When you received broadcast TV over the air the picture tended to have a variety of problems: "ghosts" or double images, fades-in and -out as planes flew overhead and a hazy picture from a too-distant transmitter, to name a few.

continued on page 10

//Cable has never really lived up to its expectations and most people are pretty fed up with it. Most are ready for a viable alternative.//



Enter The Cable Companies

So we were all looking for better. And along came cable. The promise of cable was rock-solid picture clarity and a far greater variety of programming, all at a reasonable price. Unfortunately, the reality was somewhat different.

In many areas, the cable company's delivery is rock-solid ... unless the signal goes out. Then there may be long periods of delay—sometimes hours, sometimes days—when there's no picture, no audio, no nothing (except snow). A call to the cable company may get you an explanation, such as a receiver or transmitter is down, or may result in nothing but a busy signal. Most of the time cable does work, just not all the time.

The programming variety of cable TV is usually anywhere from 10 to 40 channels, depending on which "level" of service you order. Plus, you can also subscribe to premium channels such as HBO or Cinemax, and you can have access to occasional pay-per-view shows, which you can record on your VCR if they happen to be shown at times that are inconvenient for you and your family.

Then there's the cost. How much you have to pay seems based on an arcane billing system that no one—sometimes even representatives of the cable companies—seems able to explain.

But we all know it's expensive. Many people feel they're paying \$30 or \$40 for a service that's really worth \$3 or \$4. And they may not be far wrong. Of course, each cable company has to pay for all that wire strung to every house and apartment, and for satellite dishes to receive most of its programming. But, there's also all that "leveraged financing" that's driven up the cost to the cable company itself. You may well ask how much of every dollar you pay to your cable company goes to actual delivery costs and how much goes to pay the bank loan that financed the company's excessive purchase price.

In short, cable has never really lived up to its expectations and we suspect most people are pretty fed up with it. Most of us are ready for a viable alternative. Enter the satellite delivery system.

Old-Style Satellite Delivery

Satellite delivery of video has been around for a long time, at least a dozen years. In fact, cable companies themselves receive most of their programming via satellite. (They have dishes which capture the signal, then they amplify it and send it directly to your home via cable.)

Of course, you can receive it directly, yourself. For more than 10 years, large, umbrella-shaped, metallic "dishes" have been installed in the backyards of thousands of television viewers in the U.S. and other countries. These dishes are the receiving antennas for what is termed C-band TVRO (TV



Receive-Only) satellite systems.

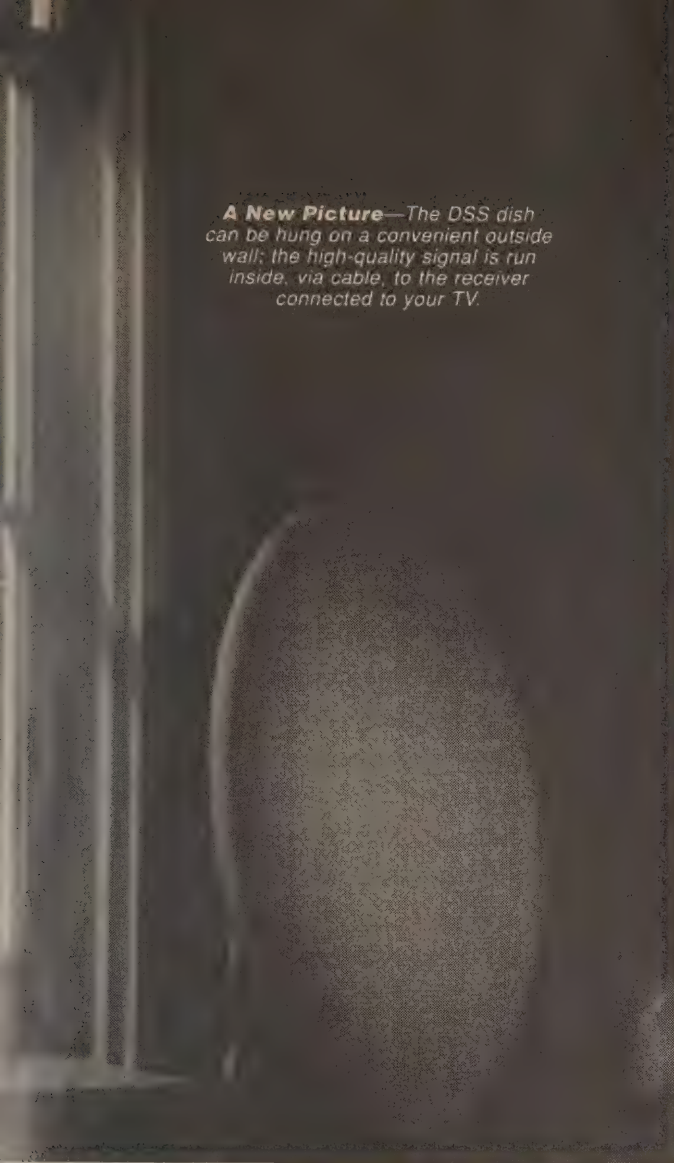
The sources for television signals aimed at these dishes are a fleet of "synchronous satellites," so named because they appear to remain stationary in the sky. Actually, they are positioned 22,300 miles above the earth and they rotate at the exact same velocity as the earth, which is why their positions relative to us down here don't change.

The antennas for these C-band satellite systems, typically six feet to 12 feet in diameter, feed special home receivers that work much like television tuners, except that they are programmed to receive only satellite frequencies.

As these two dozen different satellites, spread in an arc across the sky, carry different channels, it's important that the receiving system know where to "look" for the right channels. As each satellite channel is selected on the home receiver, the dish is commanded to rotate to another position, or "look angle," for best signal reception.

All this effort takes a special satellite-tuning receiver, antenna-rotation electronics and a large receiving dish mounted on a mast in a very stable base.

Practically all conventional home satellite trans-



A New Picture—The DSS dish can be hung on a convenient outside wall; the high-quality signal is run inside, via cable, to the receiver connected to your TV.

missions are “encrypted,” to protect programming. This is so that you can’t receive Showtime or The Movie Channel, for example, without paying a fee.

To get the premium channels, either the home receiver must have a built-in security decoder or a stand-alone decoder must be used. Once decoded, the analog video and stereo-audio signal (where provided) is available for your viewing and listening enjoyment.

For years, with such a TVRO system, video enthusiasts have had unlimited access to all forms of satellite transmissions, whether they be news feeds, movies, special events or the like, and this system continues on today.

There are some major disadvantages to the existing system, however:

(1) It’s relatively costly (typically \$2,000 for a bare-bones model, with costs approaching \$5,000 for the high-end systems).

(2) It’s relatively cumbersome and expensive to install the large, required antenna on your roof or on a big cement base in your backyard. And if you live in an apartment, you probably wouldn’t have the space to install such an obtrusive system (never mind the landlord’s permission to do so).

(3) With the plethora of programming available, knowing which shows are immediately available for viewing can be confusing; no on-screen *TV Guide* for all satellite programs is available.

(4) Last but not least, the image and sound quality are limited to the best that *analog* technology can offer, which is far less than the new digital standard, described shortly. (The word “analog” is emphasized here, because the DSS system, described below, uses *digital* technology, for even higher quality and greater convenience.)

The DSS Digital Difference

The new alternative to the conventional home satellite systems and cable are the so-called Direct-Broadcast Satellite systems. These are newer satellite systems which beam their programming directly to special receivers. This type of broadcasting has been available for some time in Europe and Japan, but not in the USA until now, thanks to the arrival of DSS (Digital Satellite System).

Instead of a fleet of satellites in synchronous orbit (as the current, large-dish systems require), only two satellites, called DBS-1 and DBS-2, are required. Because the two satellites transmit with five times the power of previous systems, only one small, 18-inch-diameter receiving dish is required anywhere in the continental U.S.

These small dishes are easy to install in a wide variety of locations around the house. And they only have to be set up *once*. And they don’t have to “look” from one satellite to another to receive programming. Further, an easy, on-screen interactive-menu procedure helps you align the antenna for optimal signal reception. Once adjusted, the antenna is locked down, eliminating the need for expensive antenna-rotation electronics.

DSS Programming

With the two satellites, at least 150 separate channels of programming are available. You may be asking yourself, why would I need 150 channels? How would I keep track of them?

The only reason you may ask such questions is because you have not seen the new system. Included is a menu-driven on-screen display, operated with your remote, which instantly tells you what’s available on each channel. You don’t need a separate television guide; the screen tells you everything.

Furthermore, if you want to watch a pay-per-view movie (the latest movies are featured long before they hit the premium channels), those movies are frequently offered on an every-half-hour basis. In other words, if you don’t want to see the movie at 7:00, it’s shown again at 7:30 and at 8:00, and so on throughout the day and evening.

Depending on the service to which you subscribe, virtually all premium programming can be seen, including HBO and Cinemax. Further, there are dozens of smaller programming features avail-

continued on page 13



Getting To Market—DSS receiver undergoes testing earlier this year (right) by engineer Jeff Cooper as Alfred Baker, manager of DBS engineering and development, looks on. Below the large crowd at Cowboy Maloney's, a dealer in Jackson, MS, which sold out of the DSS system last June on the day it was introduced.



150 Channels from page 11

able—ones that have had very limited access to viewers but which appeal to certain niche markets.

Best of all, it's all priced very reasonably. Most programming can be purchased for around \$30 per month or less. And the pay-per-view movies are about \$4 apiece, a bit more for special events.

Understanding The New Hardware

A vital part of the new system, the DSS receiver picks up the signals from the unique, parabolic 18-inch antenna, unscrambles them and displays the video on your receiver or monitor. The viewing quality is unsurpassed, with digital-video and CD-quality audio.


The Digital Satellite System is an entirely new, higher-quality, all-digital transmission system for

mass consumption of video home entertainment. If you think cable TV or video-rental quality is as good as it can possibly get, you're in for a shock! The DSS video and audio quality are comparable to laser videodisc, which far exceeds cable TV or VHS videotape-playback standards.

The digital-video quality of DSS is directly attributable to the quality of the "uplink" signals from either of the two current DSS service providers. (Uplink is a term that refers to the signals transmitted from the earth to either of the two orbiting DBS satellites.) There are two programmers, DIRECTV and USSB, operating from these satellites.

USSB's uplink in Oakdale, Minnesota, uses a

continued on next page



TV From Space—Programming is delivered to homes by two HS 601 satellites built by GM Hughes Electronics and collocated at 101 degrees West longitude. Photos by DIRECTV.

150 Channels

mix of analog- and digital-video technologies. DIRECTV'S broadcast center in Castle Rock, Colorado, is the world's first all-digital facility. It incorporates over 300 Sony Digital Betacam video recorders, a digital routing system and the capability of transmitting up to 216 video and audio channels simultaneously. The uplink transmission also incorporates the very latest digital-video-compression technology, known as MPEG. This MPEG video compression permits four to eight channels per transponder, which allows a total of approximately 175 channels of programming.

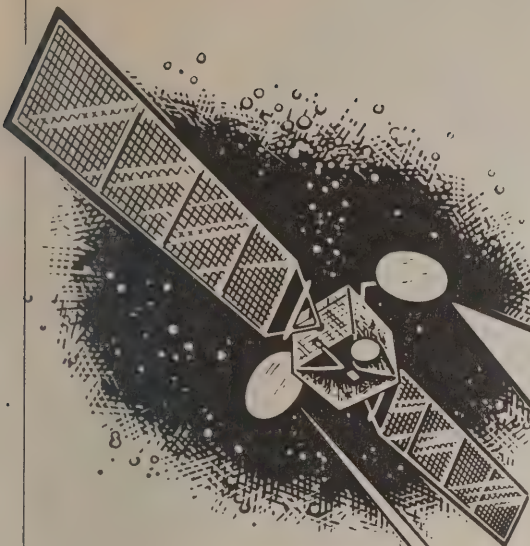
Because DSS is fully digital and "forward-com-

patible," newly emerging video technologies such as interactive services, 16:9 wide-screen, and HDTV broadcasts are technically possible with future enhancements of existing DSS satellite-transmission channels or transponders. The DSS receivers already have "wide-band data ports" to take advantage of these new video-technology improvements when they become available.

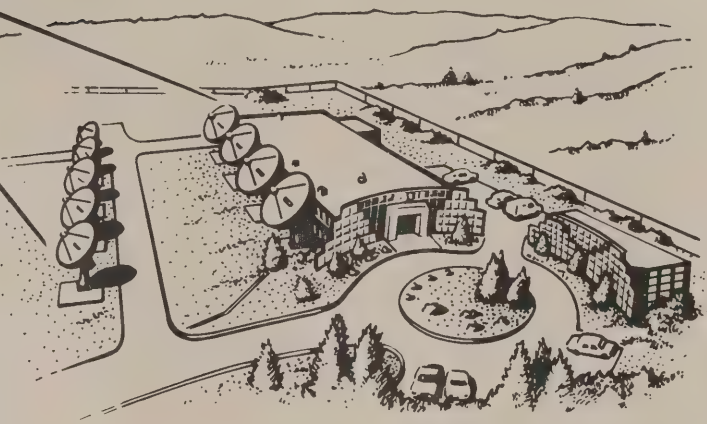
Local Programming

One thing you will not be able to pick up on DSS is the local broadcast programming in your area.

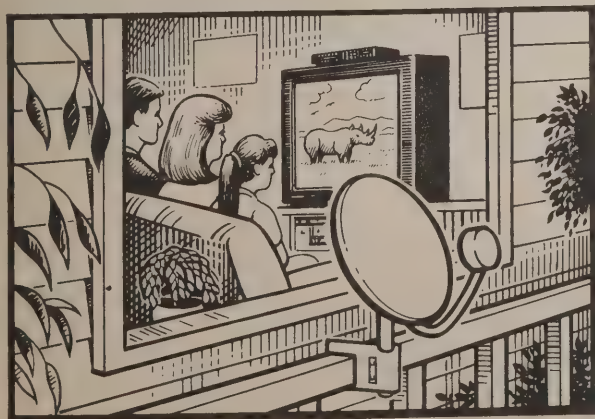
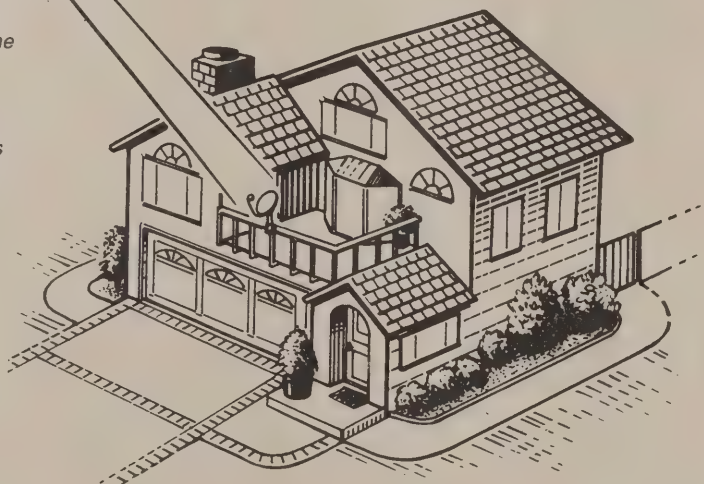
continued on page 16



1 Control Center: The DIRECTV Broadcast Center, located in Castle Rock, Colo., transmits digitally compressed programming to two Hughes-built satellites.



2 Satellites: Positioned 22,300 miles from earth, the two satellites beam programming and information directly to miniature satellite dishes conveniently installed in homes across the country. The two satellites are approximately 5 times stronger than traditional spacecraft and transmit up to eight times as many video signals.



3 Home: The signals are received by the RCA-brand DSS™ (Digital Satellite System) home receiving unit. DSS is sold through consumer electronics and satellite retail outlets across the country.

That's still from over-the-air transmitting towers, not via satellite. (And there are federal regulations which may prohibit retransmission via satellite.) This means that, in addition to DSS, you may also want the most basic cable service in order to get the local stations. Or you may want to set up an antenna to get them for free.

At Last, A Home Satellite System For Everyone

It's important to understand that the rest of the world has not been linked to cable, umbilical-cord fashion, as we have in the United States. Countries such as Great Britain and Italy have long had small-dish systems. Cable companies have not flourished in the British Isles and Europe when they have had to compete with small dishes.

In fact, if you think about it, having a central dish and then stringing a wire to everybody's house so they can receive the programming seems rather stupid when you can have a small dish and receive the programming direct. Cable is inefficient, expensive and yesterday's technology—three good reasons to dump it.

The Cost Of The New System

How much does DSS cost? The hardware (basic receiver, 18-inch antenna dish and remote control) is available from RCA/Thomson for \$699. A deluxe-model system costs \$999. You can purchase it at a wide variety of stores, including Sears, Circuit City and many others. Originally, the system was launched in only five cities in the South but, by the time you read this, it should be available nationally.

Installation of DSS can be done professionally for about \$150 or with a "do-it-yourself" kit for about \$70. Monthly programming from DIRECTV or USSB ranges from \$5.95 to \$34.95. (*See separate stories—Editor.*)

DSS Equipment Options

There are two different ways to enjoy DSS: the so-called basic system and the deluxe system. The basic system (RCA Model DS1120RW), consists of a receiver, antenna dish and remote control. The satin-gray, basic-model receiver, with its eight-button frontpanel, provides access to all DSS functions. Video outputs include S-Video and composite video. Audio outputs include left and right CD-quality audio. A wide-band data port (15-pin D connector) for HDTV or 16x9 broadcasts (when available) is built in. Other input/output connectors include satellite input from the antenna dish, antenna input (for connecting local over-the-air or cable service), an RF output for connecting your TV receiver or VCR and a modular telephone jack for connection to the programming service for billing.

The antenna dish is a gray, 18- by 20-inch metallic parabolic reflector weighing 10 pounds, with a



single type-F output connector for hookup to a single TV receiver. The CRK91A1 infrared remote control has 30 buttons, controls DSS access and runs on four AAA batteries.

The receiver of the deluxe version (RCA Model DS2340RW) is identical to that for the basic system, with the exception of external color (spatter ebony), composite video output, two pairs of left and right audio-output jacks and a low-speed 9-pin data connector for non-video information. The audio/video RCA jacks are gold plated for better contact.

The deluxe dish is a light gray, 18- by 20-inch metal/glass reinforced-plastic parabolic reflector. Twin Type-F output connectors are provided for multiple-receiver setups. The 39-button CRK91B1 infrared remote is the "universal" type, which means that, not only does it control the DSS receiver, it can also be taught the functions of your VCR, cable box and/or laserdisc player.

The Bottom Line


Most of us really don't care how we get out television, whether it be over the air, cable or direct broadcast via satellite. Most of us don't even care desperately about whether the picture is okay or great—that is, until we see how great digital video really is! What we want, however, is reliability: a good clear picture, lots of programming to choose from and a reasonable price. We haven't had that until now.

The new Digital Satellite System brings the future of television into your home. At last, you can get what's been promised for the past 40 years. It's out there, now. And all the reports we've heard suggest that it's so popular that dealers simply can't keep it in stock. If you want the best and the cheapest in one simple package, you'll want to check into DSS. ●

The DSS Timeline

1981	USSB, a subsidiary of Hubbard Broadcasting, applies to the FCC for a Direct Broadcast Satellite (DBS) permit.
1982	USSB receives DBS permit in the first round of FCC permit process.
1984	Hughes applies for and receives an FCC permit to build and operate a high-power DBS system.
1989	
June	Hughes begins systems design and digital compression requirements for the high-power DBS system.
November	Hubbard Broadcasting/Conus Communications in partnership with Viacom begins production of the All News Channel, the first news and information service developed specifically for the direct-to-home satellite television market.
1990	
	Hughes Aircraft begins construction of nation's first Direct Broadcast Satellite, DBS-1.
1991	
May	Hughes announces definitive plans to implement the nation's first DBS service. Company commits more than \$600 million to develop the system.
June	Hughes and USSB agree to develop a common distribution system for DBS service. Under the provisions of the agreement, Hughes will build a five transponder payload for USSB on its first high-power satellite. The two companies will use the same digital compression and encryption technologies, currently being developed under the direction of Hughes. Service is planned to begin in the summer of 1994.
July	DIRECTV™ unit is formed to operate Hughes' DBS business.
1992	
October	DIRECTV signs contract with Arianespace to launch DBS-1.
February	DIRECTV selects Thomson Consumer Electronics (TCE) and News Datacom to provide the digital transmission system, encryption system and initial consumer receiving units for DIRECTV and USSB. The consumer receiving units will be marketed under TCE's RCA brand.
July	DIRECTV breaks ground for Broadcast Center in Castle Rock, Colorado.
November	DIRECTV and TCE successfully demonstrate satellite transmission of digitally compressed video and audio signals.
1993	
January	DIRECTV signs initial programming deals for nation's first DBS service with Paramount Pictures and The Disney Channel.
March	USSB reaches agreements to offer Viacom's Showtime, The Movie Channel, FLIX, MTV, VH-1 and Nickelodeon networks, and Time-Warner's HBO and Cinemax as part of its service.

May	USSB selects JC Penney Business Services to handle customer service and support, telemarketing and billing operations. DIRECTV signs second satellite launch contract (DBS-2) with Arianespace.
June	DIRECTV announces milestone programming agreement to offer Turner Broadcasting's CNN, Headline News, TBS, TNT and Cartoon Network as part of its service. Separate agreements are also reached by DIRECTV with USA Network, Sci-Fi Channel, TNN, CMT and The Family Channel. DIRECTV adds The Discovery Channel, The Learning Channel, CSPAN, CSPAN2 and E! Entertainment Television.
July	Comedy Partners' Comedy Central network joins USSB line-up.
October	USSB breaks ground for National Broadcast Center in Oakdale, MN. Hughes completes final integration and systems test on DBS-1.
November	DIRECTV selects Sony Corporation to become second manufacturer of DSS. Sony Electronics, Inc. is chosen to supply broadcast playback and monitoring systems, and integrate the associated switching, automation and master control systems at USSB's National Broadcast Center.
December	Hughes ships DBS-1 to French Guiana for launch. Hearst/ABC-Viacom Entertainment Services' Lifetime network completes USSB's programming line-up. DIRECTV adds five special interest channels: Court TV, The Weather Channel, The Travel Channel, Playboy TV and The Golf Channel.
1994	
January	DBS-1 is launched on Arianespace rocket from French Guiana.
February	Encore and its six thematic movie channels join DIRECTV's line-up.
April	DIRECTV announces agreement to carry ESPN, the nation's largest cable network.
June	DIRECTV reaches agreement with Walt Disney Pictures, Touchstone Pictures, Hollywood Pictures and Miramax Films. Warner Bros. agrees to provide its major motion pictures to DIRECTV.
August	Regional rollout of DSS begins, with programming services provided by both DIRECTV and USSB, and DSS hardware manufactured and distributed by Thomson Consumer Electronics under the RCA brand. DBS-2 launched successfully.

By year-end, DIRECTV adds pay-per-view agreements with Universal Studios, Sony Pictures Classics, Columbia Pictures and Tristar Pictures. 



INSTALL IT YOURSELF

**RCA Gives You A
Simple Manual And Videotaped Instructions
That Make It An Easy Job**

by Robert Irwin and Tony Gomez

The Digital Satellite System (DSS) is the most convenient satellite system to install at home. Almost anyone can do it with a minimum of effort and a few tools usually found around the house. That doesn't mean, however, that the installation is simple or can be done in a haphazard manner. In order to properly receive video signals, the antenna (dish) must be rigidly installed and properly aimed at two satellites located 22,300 miles above the equator, in the "Clarke" belt (so-named for Arthur C. Clarke, the scientist and writer who described how satellites launched in an orbit around the equator at the proper altitude would appear to be stationary).

Generally speaking, DSS installation involves mounting the antenna in an appropriate external location with an unobstructed line-of-sight to the two orbiting DSS satellites, then connecting a cable (or cables) from the dish to the receiver(s). Finally, the receiver itself is connected to your television and/or home theater system.

Using the self-installation kit described below, you can easily perform the survey and alignment required. However, it will undoubtedly take you longer than it would a professional installer. Additionally, you'll need hand tools and probably a ladder.

The big decision for most people will be, "Should I or shouldn't I do it myself?" Our sugges-

tion is: If you're at all handy, give it a try. The instruction manual and videotape provided by Thomson Consumer Electronics (RCA) in the optional self-installation kit are extremely detailed and helpful, although they can sometimes seem a bit intimidating because of the technical jargon used. Nevertheless, keep in mind that you're not building a nuclear generating plant; you're just setting up an 18-inch dish. The installation can be fun, even a family project. And you'll probably enjoy your DSS system more, knowing that you installed it yourself!

The Installation Kit

A "do-it-yourself" installation kit (RCA Kit DKIT94) is not included in the antenna systems, but is available for \$69.95 at any authorized DSS dealer. The kit contains a compass, installation hardware, antenna cable, a descriptive book explaining how to install the system and a thorough, one-hour videotape guide that demonstrates installation of the DSS system in a variety of situations.

If you're considering self-installation, the kit is almost a necessity, since you'd end up spending nearly as much buying the contained equipment separately, and still would need the tape and instruction book.

If you prefer not to do it yourself, professional installation should cost about \$150 to \$300 depending on the difficulty of the task.

continued on next page

The Works—Everything you need (and more) for a complete installation for most locations.



The Antenna

When you purchase the satellite system, you get three elements. The satellite antenna itself is an 18-inch, slightly oval-shaped reflector. Technically speaking, the dish is a "gathering area"; it gathers the signal sent from the satellites over the equator. Since it is in the shape of a parabolic reflector, it then focuses the tiny signals to a central point, where a "Low-Noise Block Converter" (LNB) is located.

The LNB receives the now concentrated signal and converts the 12.2GHz-to-12.7GHz signal frequency broadcast by the satellites to the 950MHz-to-1450MHz signal frequency used by the receiver.

The antenna system actually offers two types of LNB: single and twin. The twin output allows two signals to be sent from the antenna, for connection to two separate receivers or as part of a larger distribution systems such as might be found in an apartment building.

The Receiver

The receiver can be located almost anywhere inside your home and is connected by wire to the antenna. The receiver decodes the digital signal sent by the satellite and processes it.

The Remote Control

The remote operates the receiver. It has virtually all the controls needed, not only to tune the receiver to various channels, but also to help aim the satellite and to operate the menu functions available. At a later date, the remote will also be used to handle interactive functions including games.

Dish Installation

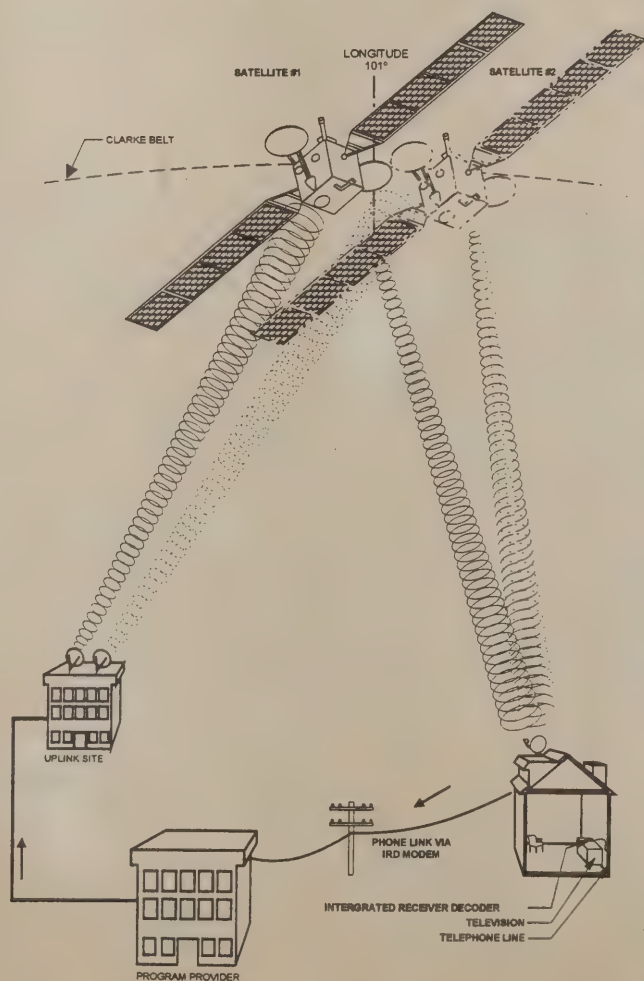
The first step in installing your dish is finding the proper site location. There are two considerations here. The first is that the dish be able to receive a true line-of-sight signal from the satellites. The second is that it be located in an unobtrusive part of your property.

Typical location sites are on top of your house, on a wall, attached to a chimney, on a fence or in a separate cleared area in your yard. Keep in mind that, wherever you install the dish, you will need a solid, immovable mounting. This can be a roof joist, wall stud, chimney or cemented post mounted in the ground.

When making the site determination keep the following requirements in mind:

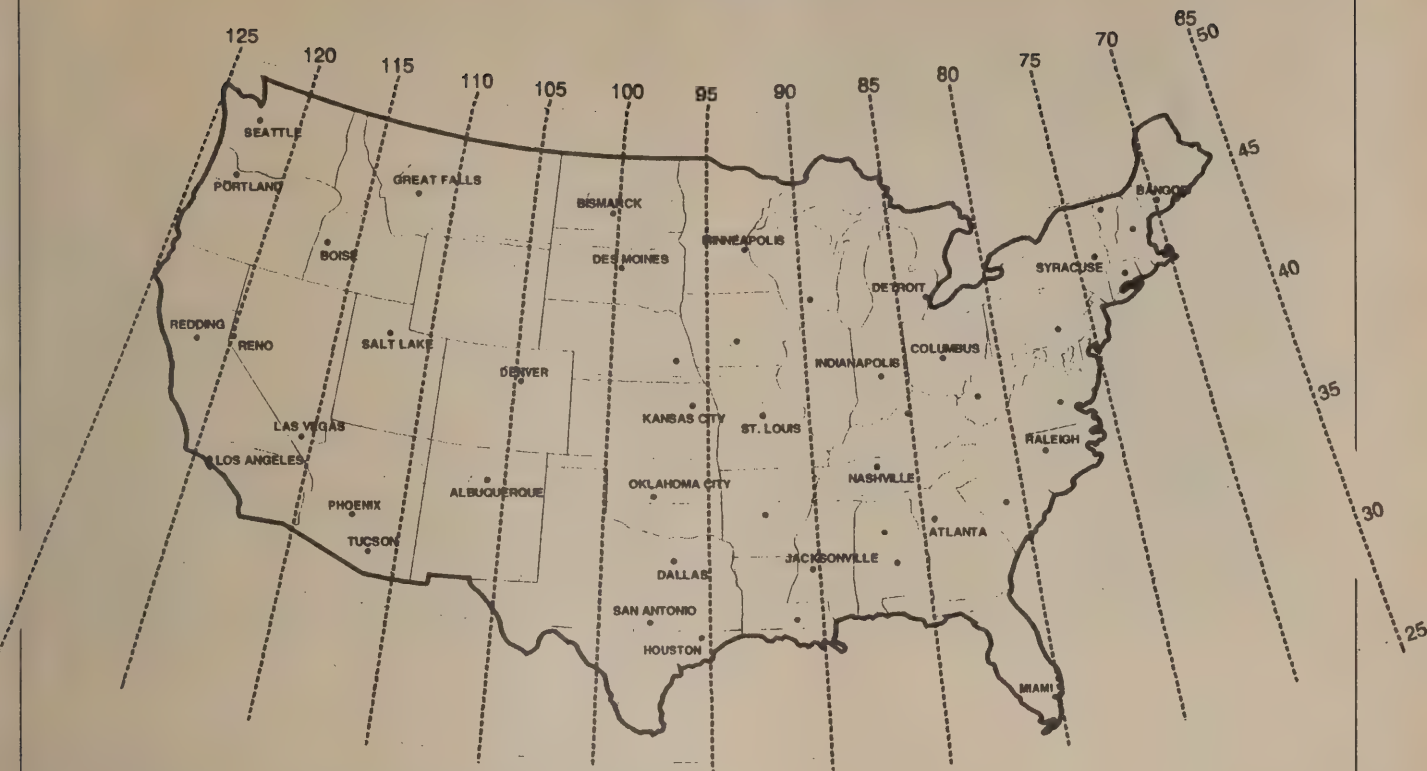
- **Safety**—You don't want the dish to fall, be too close to electrical wiring or be dangerous to install where you decide to put it.

- **Line-Of-Sight**—The dish must be able to have a direct and totally unobstructed view of the two satellites, located at the southern horizon. (The two high-power, Ku-band satellites are located less than



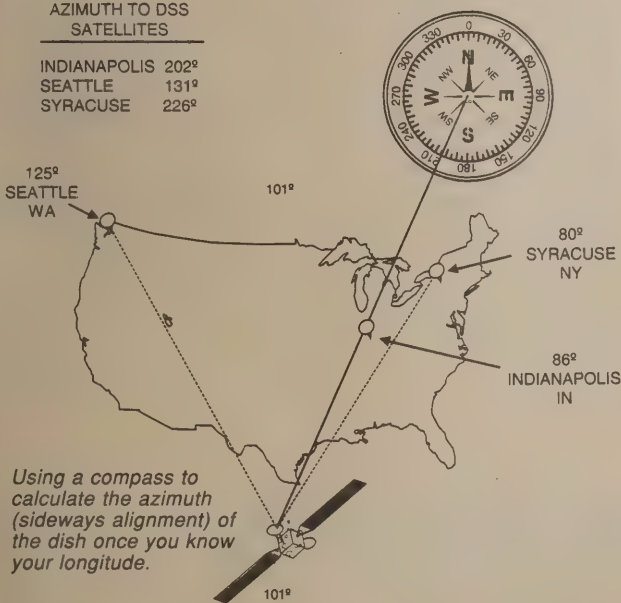
The basic satellite-reception system.

Map giving longitudes and latitudes for the U.S., used to help with rough aiming of the dish.



AZIMUTH TO DSS SATELLITES

INDIANAPOLIS	202°
SEATTLE	131°
SYRACUSE	226°



.5 degrees apart. Their close proximity lets a fixed antenna receive signals from both.)

- **Mount**—You must determine how your dish is to be mounted. There are separate mounts, depending on whether you'll be putting it on a horizontal or vertical surface. In addition, mounts for poles and chimneys are also available.

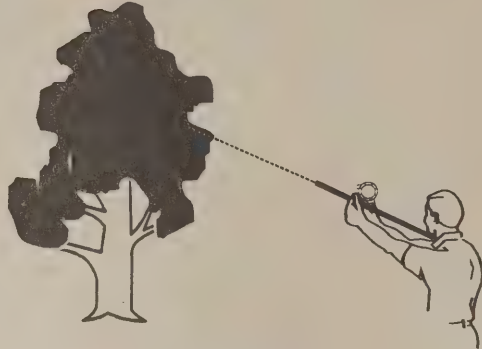
Perhaps the best way to begin is to select several sites that are acceptable from an aesthetic viewpoint and then determine if they are suitable in terms of

signal reception. Pick the optimum site and then scan the southern horizon, making sure there are no buildings, trees or other obstructions in the way. Then secure the dish temporarily, using the equipment supplied in the kit.

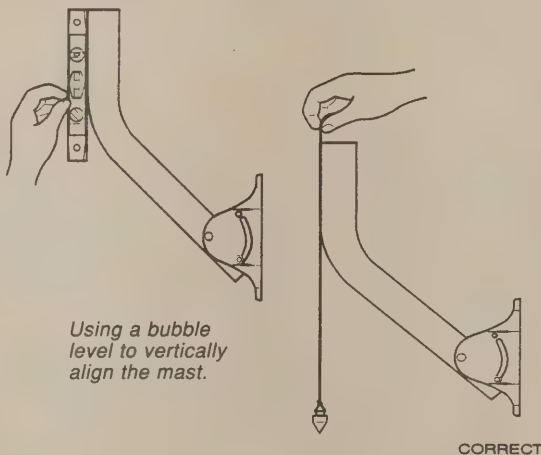
Now make a rough alignment. To do this you must first know the general direction in which to aim or align the antenna. Because the DBS-1 and DBS-2 satellites are in geosynchronous orbit in the 101-degree position, your specific geographical location in the U.S. will determine the direction in which your dish should point. For example, if you're in Seattle (which is located at 125 degrees), you must adjust the azimuth (side-to-side bearings) to point the antenna in a general eastward direction. If you're in Indianapolis (86 degrees), you must point the antenna in a more westward direction. (A chart accompanying this article shows the various azimuth and elevation locations for the U.S.) Using a compass you should be able to quickly find the correct location. (If you have trouble following this, don't worry about these setup calculations because the DSS system has a very friendly way to determine the correct values.)

Also, the elevation (up and down) must be adjusted for your particular location. A Houston location would have an Elevation setting of 48 degrees, while a Minneapolis location would require 37 degrees. A simple protractor laid flat can give a close reading here.

continued on next page

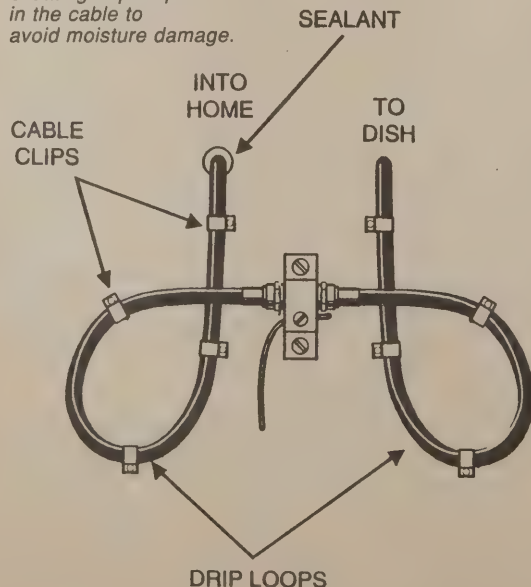


Confirming a clear line-of-sight to the DSS satellites.



Using a bubble level to vertically align the mast.

Creating drip loops in the cable to avoid moisture damage.



Letting The System Align Itself

After you've got the approximate direction down, the DSS system has a simplified way of determining the correct starting positions. Connect your dish to your receiver. With your DSS receiver on, access the Main menu, select 4 (Options), and from 5 (Setup Submenu) select 2 (Dish Pointing). Select 1 (Zip Code). Enter your zip code with the keypad, and the display will show the correct Azimuth and Elevation settings. Record these numbers on paper.

Now go back to the Main menu, select 4 (Options), 5 (Setup), 2 (Dish Pointing), and 3 (Signal Meter). This creates a graphical pattern on the screen which is the strength of the signal received by the antenna dish. Return to the site location of the dish and set the azimuth and elevation according to the required settings. Through a process of fine-tuning, adjust the Azimuth and Elevation settings until the signal reaches its peak level.

If you hear a series of short-tone bursts on the TV monitor, the DSS antenna is not properly aligned. When the tone becomes continuous, the signal is being picked up correctly.

Obviously, it would be helpful if you had a partner telling you the results, or you could feed the receiver's output to a portable TV near the dish.

Move the antenna in small increments, first about the azimuth direction (right or left), and wait for the signal to maximize. Then move the dish up or down in the elevation direction in small increments and wait for the signal to maximize.

Once the signal-meter display is maximized, that's it.

Rechecking The Site

At this point, it's a good idea to check again to be sure that there is a clear and unobstructed line-of-sight between the dish and the horizon. Be particularly watchful for trees that might grow taller and obstruct the signal later on.

If the site is still suitable, then the dish should be locked down. Once properly positioned, it need not be moved again.

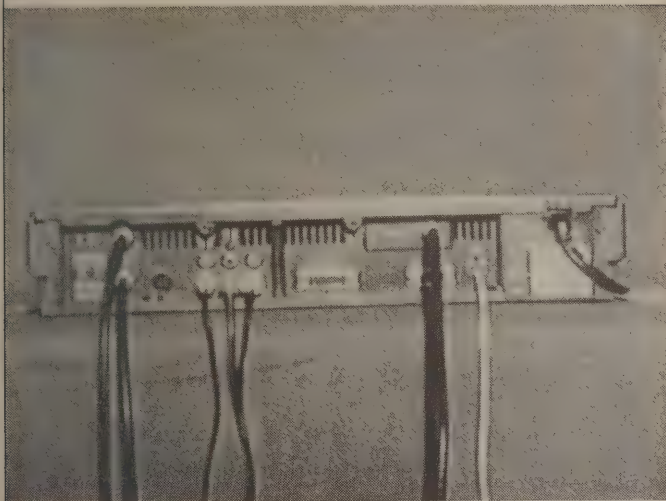
Note: When mounting the dish, the mast *must* be level. The "Installer Manual" provided with the RCA installation kit is invaluable in showing exactly how to accomplish this in a wide variety of installation locations from chimneys, to walls, to flat surfaces.

Connecting To The Receiver

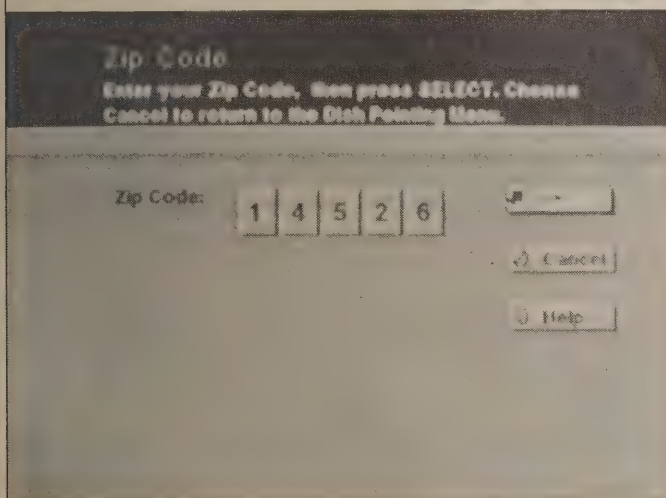
Once you've gotten your dish properly mounted, you'll need to connect the coaxial cable to your receiver. Since the receiver is most often in a living room or den, frequently located some distance away, you may want to string the wire under the house, over the roof, through the attic or even around the outside walls.

However you place the wire, it is important to

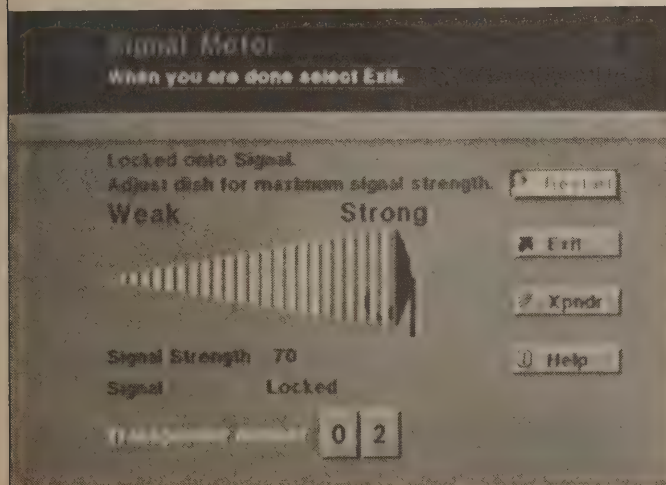
Rear connections to the receiver are well-marked and easy to locate.



Alignment process begins when you enter your zip code on the receiver.



On-screen signal meter lets you know when you've got dish properly aimed.



Setup—It's easiest to have one person moving the dish, while another, inside, watches alignment on the receiver.


keep in mind the following considerations:

- **Protection**—Be sure that the cable is protected from physical damage including moisture. This means that you won't want it located where it might be abraded or come in contact with standing water. Avoid locations where the wind will whip it back and forth; if necessary, make sure it is properly tied down. Keep it out of gutters and low areas on flat roofs where water may accumulate.
- **Grounding**—The cable itself is composed of an inner wire and an outer metal shield. The outer shield should be grounded. RCA recommends using a ground block (a barrel connector to which you can install a ground conductor). Where lightning could be a factor, the cable should be connected to the building's grounding system. Always make the ground wire short and straight, and connect it close to where the cable enters the house. The Installation Manual suggests that number-10 copper or number-8 aluminum wire be used for grounding. Be sure and check with the building-code requirements in your area as well as the National Electrical Code (specifics given in the "Installer Manual").

A Successful Installation

Plan on spending a morning or afternoon setting up and aligning your dish. Also plan on buying the Self-Installation Kit or else you will be asking for a lot of grief. With the instruction manual, the tape, this article and a little bit of good judgement, you should find that the installation can be fun.

Besides, if you do it yourself, you'll always know how it works. And if, later on, you decide to move, you won't hesitate to disconnect the antenna and take it with you, setting it up again elsewhere.

Once it's set up, you're ready to enjoy the incredible wealth of programming with the DSS system. 

by Lloyd Covens

You've seen the ads. You've heard the buzz. Clearly, one of the most sought-after high-tech devices on the market today is the new Digital Satellite System (DSS) from RCA. But before you go shopping read this article to prepare yourself for that visit to your local electronics chain or satellite TV dealer. And by all means, do some shopping. As hot as the DSS product is, you can still take advantage of the same kind of customer support and follow-up you've come to expect with any high-end purchase.

The stated goal of DIRECTV and USSB (the program providers for the DSS entertainment system) is to have nationwide coverage for a retail point-of-sale at more than 8,000 stores by the end of the year. Already, six of the top 10 national retailers have committed to selling DSS to consumers.

The suggested retail price for the basic DSS unit is \$699. This includes an 18-inch dish, an all-digital receiver (smaller than most VCRs) and an advanced remote control. If you decide to purchase the self-installation kit, you will also get a videotape that outlines the setup procedure, 100 feet of cable (to go from your dish to the receiver) and additional hardware. *(See the article on self-installation on page 18—Editor.)*

Shopping for DSS

There are basically three categories of retailers that can provide you with a DSS system. The first is the mass merchandiser—a national group of retail chains able to pool their major buying power to deliver DSS along with the latest in large-screen, stereo, high-resolution televisions and advanced audio gear. Among those ready to sell DSS are Sears Roebuck, Circuit City, Best Buy, Montgomery Wards' Electric Avenue departments, Silo and selected Radio Shack stores.

Often, these mass merchandisers offer revolving credit, maintain professional installation teams and even occasionally discount some electronic equipment. (Note: The demand for DSS is expected to remain high above manufacturing capacity into early 1995. Therefore, pricing is expected to remain close to the "manufacturer's suggested retail" of \$699 for the basic system and \$899 for the deluxe version.)

The regional merchandising companies are strong retail chains operating in a group of states and offering special attention to local interests. For instance, in California, "The Good Guys" stores are selling DSS; in the Midwest H.H. Gregg is a major retailer that will stock and sell inventory.

The next group of retailers includes several department-store chains with television or computer departments, which have committed to selling the new small-dish system. These are stores like Dillards, Robinsons May, Foleys and Wards' subsidiary Lechmere.

DSS Buyer's Guide

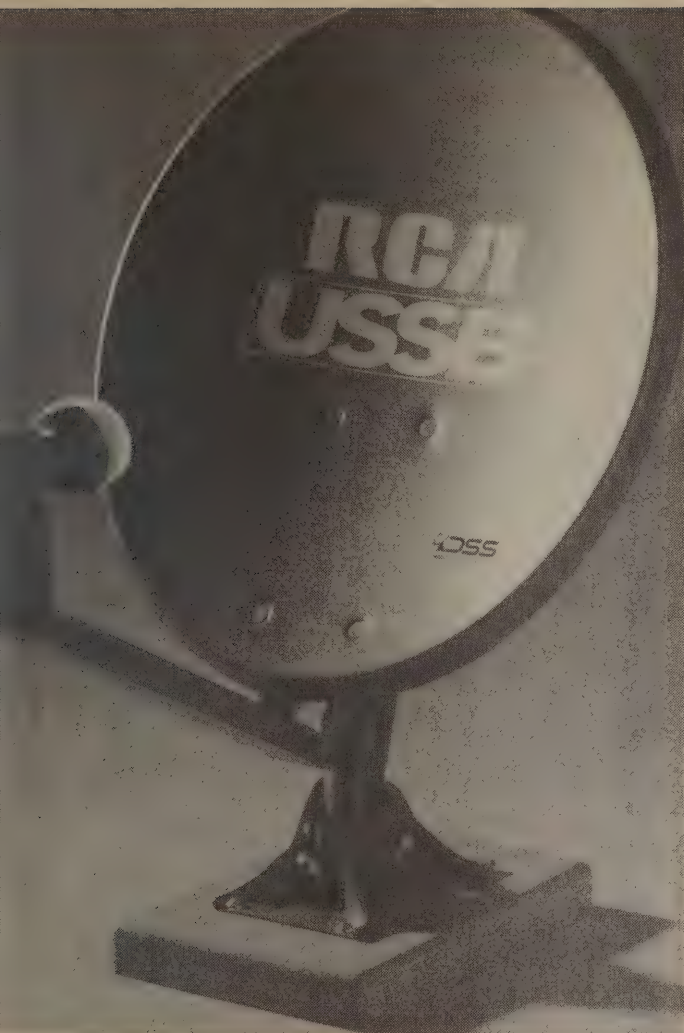
The Smart Way To Shop For Your Digital Satellite System

Basically, you'll find the lead regional television specialists either now selling DSS or planning to do so in 1995. Keep in mind that, after July 1995, Sony Electronics Inc. will offer DSS systems and will begin supplying their own chain of distribution. In 1996, additional DSS manufacturers are slated to be licensed to build and sell the same units, although features and pricing may vary.

The third possible place of purchase is your local satellite dealer authorized to sell DSS. While you may want or need to forgo putting your purchase on a credit card honored by large regional or national retailers, you'll find the service and attention to detail offered by your local authorized satellite system professional unequaled. This is another important consideration. Of the 2,500 national satellite dealers selected by DIRECTV and RCA, all were screened for solid financial situation, good track record and product knowledge. If you have a difficult or remote satellite installation, your local satellite retailer may be your best bet.

The RCA Kiosk/Laserdisc Presentation

All retailers of the DSS products are required to have an RCA DSS "kiosk," or information stand.



In addition to a large-screen TV, brochures and panel of accessories, the kiosk houses a special laserdisc player which has eight short presentations on commonly asked questions about DSS. When you visit your retailer, you can request that particular chapters be played or enter one or more of the selections yourself.

The different clips cover:

- Introducing The System
- Programming And Service
- USSB Programming
- How Satellite TV Works
- Picture And Sound
- Big-Screen And Home-Theater Applications
- How To Use RCA/DSS
- Installation

Your salesperson has probably undergone extensive training on all elements of the DSS operation, installation and programming. Don't be afraid to ask any question that occurs to you.

Of particular interest to the retailer will be getting your business now and keeping it for future purchases. If you don't have a favorite retailer among those mentioned above, now is a good time to shop

for a retailer with whom you can develop a long-term relationship as you consider future purchases to enhance the value of your DSS system.

Keep in mind that, in addition to the straight DSS purchase, you may also want to get one or more of the following: a new TV to take advantage of the Super VHS capability of DSS, which offers several hundred more lines of vertical resolution more than your regular TV; additional sound enhancements—new speakers, amplifiers and recording devices to take advantage of the DSS system stereo broadcasts and CD-quality sound. (DSS supports Surround-Sound, Pro-Logic receivers and dual right and left outputs.)

If you go to a dealer that handles all of the above products, you may be able to work out a discounted package deal that will save you considerable money over buying the components separately.

Service And Extended Warranty Contracts

Your standard DSS warranty is good for 90 days, and some retailers extend that coverage for up to three years for a fee. Be sure to get all the details of your warranty. As with any expensive purchase, you may want to take advantage of the extended protection. Thomson-built RCA electronic products have a high level of reliability. In my opinion, with a properly grounded unit and placement of the receiver in an area which allows ventilation, electronic-circuitry failure is a remote prospect.

Professional Installation

I highly recommend that you consider a professional installation offered by the dealer, if you can handle the \$150 to \$225 this adds to the cost. The reason is twofold. For one thing, self-installation has some time-consuming aspects, like the grounding of the antenna and the running of a telephone line to your closest TV jack. And while, at first glance, the unit may seem easy to install, if you do not have a \$1,000 digital signal tester, you may have a hard time precisely aiming the dish at the satellite. With an improperly aligned dish, you may get varying levels of signal strength and may find yourself getting a perfectly good signal one day, and due to rain or snow conditions, not getting a clear signal at all on another day.

The second reason to consider professional installation is an aesthetic one. Loose cable wires are unsightly, and even someone who is handy with a drill may find that going through a wall or floor for a cable run is quite complicated. If you have a second television or an especially long cable run, think again about opting for professional installation. (Also, see the article on self-installation—Editor.)

The bottom line is that DSS retailers will soon abound across the country and there'll be a host of options to consider. In short, you won't miss out because you can't find a dealer. You'll only miss out if you fail to take advantage of this new wave of the digital revolution. ☛

Launching The "Birds"

The Super Technology That Makes Satellite TV Delivery Possible

by Robert Oakes

Three, Two, One ... Liftoff!

Although these words were far more familiar in the 1960s than they are today, the launching of rockets into space continues on a more-than-weekly basis. And on two of those unmanned rockets in recent months have been satellites that are responsible for the new "small-dish" revolution in the United States, the DSS (Digital Satellite System).

While most people only care that it works, how the recently launched satellite system delivers the TV signal presents a fascinating glimpse into the latest video and space technologies. Consider, a conventional radio station has to broadcast over-the-air at 50,000 watts to reach a regional audience. Yet, a satellite suspended over the equator, broadcasting at only 120 watts, can deliver a strong signal to every home in the lower 48 states!

How It Works

The basics of satellite transmission are fairly easy to understand. There are certain necessary elements,

including a stationary platform from which to send the signal, a way to get a transmitter to that platform and a means of receiving the signal back on earth. Let's start with the platform.

The Clarke Belt

Most people are familiar with Arthur C. Clarke, a science-fiction writer whose credits have included: *2001—A Space Odyssey* and the *Rama* series of books. However, Clarke, who for years has lived on the island of Sri Lanka, is also a brilliant scientist. In 1945 he theorized that if a rocket were launched from the earth above the equator and its speed matched that of the earth's rotation, at a precise altitude (approximately 22,300 miles up), that rocket would appear motionless in space. In other words, the centrifugal force tending to push the rocket away from the earth would almost exactly match the gravitational pull of the earth and it would seem to hang suspended in a "geosynchronous orbit"—making it a perfect satellite platform for sending and receiving information to and from earth.

continued on page 28

\\Satellites are like relay stations. Programming, such as a movie, football game or special event, is sent to the satellite from an earth 'uplink' station. Transponders on the 'bird' capture, amplify and then retransmit the signal to every home in the lower 48 states.//

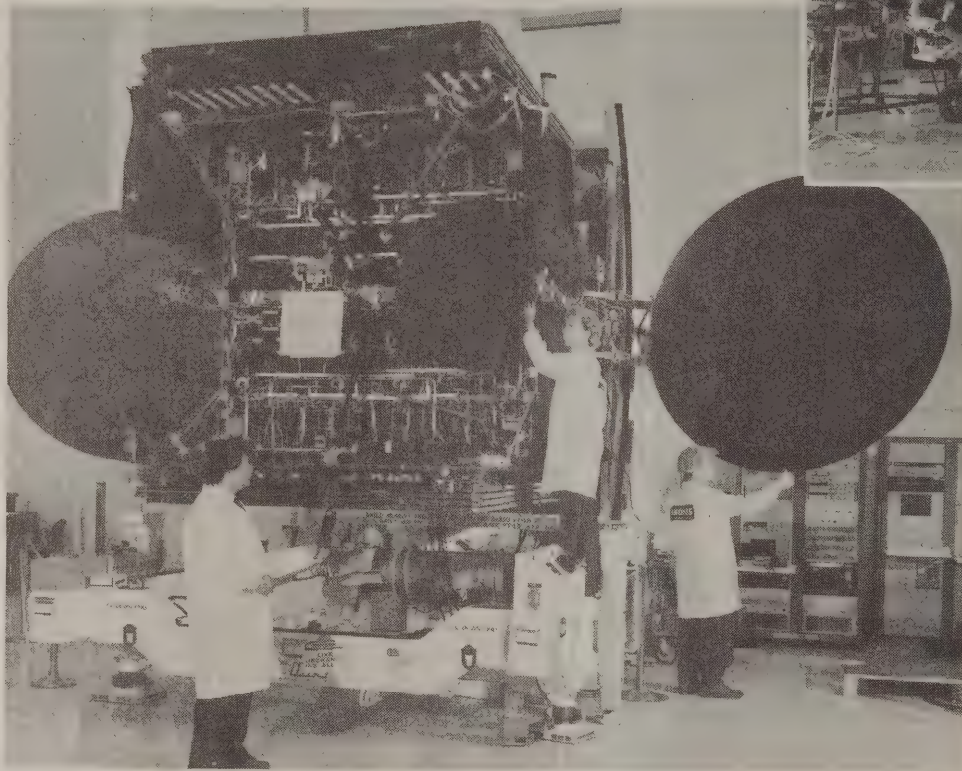


ATTENTION!
FLIGHT
HARDWARE
HANDLE WITH CARE

157

Launching The "Birds" from page 26

Powerhouse—The new Direct-Broadcast Satellites produce 120 watts per channel. The power is needed to allow for a small receiving dish. Blankets (above) ensure that the "bird" maintains a constant internal temperature in orbit, despite the intense cold of space and unfiltered heat from the sun. Satellites are tested in an environmental chamber at Hughes Space And Communications Company. Shown, right, is Brasilsat B1 about to enter the chamber.



Today there are over 500 research, military and communications satellites, launched from rockets, "parked" in the Clarke belt over the equator. These "birds" receive signals from powerful earth stations and then retransmit them back.

The Launch

It was two Ariane 4 rockets which carried the DSS satellites into space, one in December of 1993 and one last August. The booster took the spacecraft to geosynchronous transfer orbit from the launch site in Korou, French Guiana. The spacecraft's integral liquid apogee motor then raised it to geostationary orbit 22,300 miles (36,000 kilometers) above the equator. The flight-proven bipropellant propulsion system included not only a 110-pound-force Marquardt apogee motor, but also a dozen five-pound-force thrusters for stationkeeping during each satellite's 12 years in orbit.

The Birds

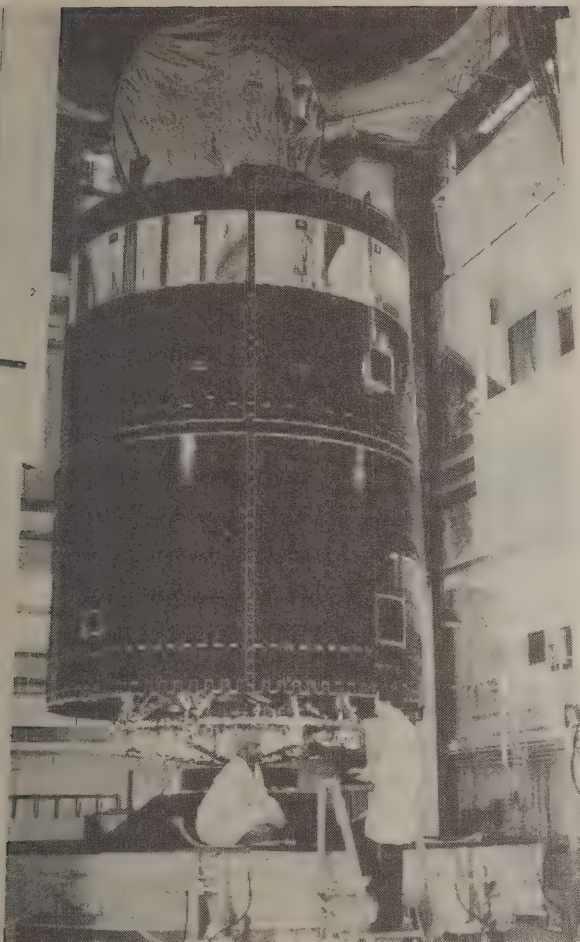
Normally, the rockets which launch the satellites fall back to earth, leaving the bird in approximately the correct orbit. Small, onboard stabilizing and directional movement rockets then make position-

ing adjustments when needed so that the satellite enters, and remains in, its precisely correct orbit. These small rockets rely on chemical propellant, which is eventually used up; that's part of the reason that the life span of a bird is only 10 to 12 years.

The satellites themselves vary enormously in power and size. Until recently most of the commercial video satellites transmitted in the C band (3.7 GHz to 4.2 GHz) at around 15 watts per channel. (The first C-band birds transmitted at only 5 watts!) There are currently nearly 30 of these birds in the Clarke belt.

Because of their low power, it takes a large home satellite dish to receive their signal, typically six feet across or more. However, the new Direct Broadcast Satellites (DBS) transmit at 120 watts and at a higher, Ku-band frequency (12.2 GHz to 12.7 GHz), which is the reason that only a small, 18-inch dish is required.

One of the problems with all satellites in the Clarke belt is separation so that the signals from one bird do not overlap those of another. C-band birds need to be roughly two to three degrees apart. The new, Ku-band birds transmitting at higher power,



however, need to be nine degrees apart. (One by-product of the demand for communications from satellite is that the Clarke belt is rapidly becoming overcrowded, like a parking lot with too many cars trying to fill it.) Interestingly enough, the two DSS satellites are spaced only half a degree apart. This is so that the signals from both can be picked up by a single dish on earth.

Uplink And Downlink

It's important to understand that the satellites themselves do not originate any programming. Rather, they are like relay stations. Programming—for example, a movie, sitcom, football game or whatever—is sent overland to an earthbound uplink station. There large dish antennas, aimed at a particular satellite, broadcast the signal into space. That satellite's receiving antenna captures the incoming video and audio information, converts it to different frequencies, amplifies it and then sends it back to earth. This transmitter/receiver package is called a "transponder."

The amount of the earth's surface that the satellite's rebroadcast signal reaches is called the satellite's "footprint." The footprint of the new DSS

satellites is large enough to encompass the entire continental United States.

The operations-control center for the satellites is at HCI headquarters in El Segundo, California; telemetry and command terminals are in Castle Rock, Colorado, and Spring Creek, New York. Uplink will be from the DIRECTV Castle Rock Broadcast Center, which will be capable of transmitting 216 simultaneous broadcast channels to the two satellites.

The Home Dishes

A word needs to be said about the dishes here on earth, which receive the signal from the far-off satellite. The dish is not the actual receiver. It is simply a parabolic reflector. Because the TV signal coming from space is so weak, a lot of it needs to be gathered. The dish gathers the signal and then focuses it at a central point. Located at this central point in front of the dish is a Low-Noise Block (LNB) converter. This LNB receives the focused signal, amplifies it and converts it to frequencies that can be sent by coaxial cable to the receiver in your home. It is the receiver inside your house that finally transforms the satellite signal into information that can be seen and heard on your television set.

The DSS Satellites

The two high-powered satellites built by Hughes Space and Communications Company (HSC) that are now bringing true direct-broadcast satellite (DBS) service to homes throughout North America are HS 601 body-stabilized models ordered by Hughes Communications, Inc. (HCI). The first was shared by HCI subsidiary DIRECTV, Inc., which operates 11 transponders, and by United States Satellite Broadcasting (USSB), which operates five transponders. The second spacecraft is operated solely by DIRECTV. Together, the satellites are capable of delivering more than 150 channels of entertainment programming to subscribers who use the small, 18-inch-diameter receiving dishes and the required in-home digital decoders.

To provide the high satellite power necessary for such small antennas, each DBS spacecraft has 16 transponders powered by 120-watt traveling-wave tube amplifiers (TWTAs). The TWTAs can be reconfigured to provide eight channels with 240 watts of power. The amplifiers are suitable for analog or digital signals, and are capable of transmitting high-definition television (HDTV) signals and compact-disc quality audio as well.

As noted, the satellites operate in the BSS portion of the Ku-band spectrum (12.2 GHz to 12.7 GHz). They employ circular polarization which aids in separating the channels. Depending on the configuration of the transponders, they can deliver 48 dBW to 53 dBW of radiated power over the contiguous United States and southern Canada. The spacecraft are collocated at 101 degrees West longitude.

continued on page 82



All Those Channels

**Your Program Choices
Increase Dramatically With
Your New Dish**

by Lloyd Covens

For the casual viewer of television today, the arrival of the Fox network years ago heralded a new day in expanded program choices. Today, cable carriage of an average of 30 channels has made household names of such services as CNN, ESPN, USA, The Discovery Channel, HBO and The Disney Channel. But many, many other channels get spotty carriage at best, and some—like The Cartoon Network and The Sci-Fi Channel—have enticing names, but no room for carriage on your local cable lineup.

Enter DIRECTV: the new direct-to-home satellite service which offers consumers a potpourri of the “best of cable” along with other, unique offerings not on any cable systems. For viewers with many interests, the package of 150 channels is enhanced by the-20 channel package offered on the same

satellite from United States Satellite Broadcasting (USSB).

Pay-Per-View

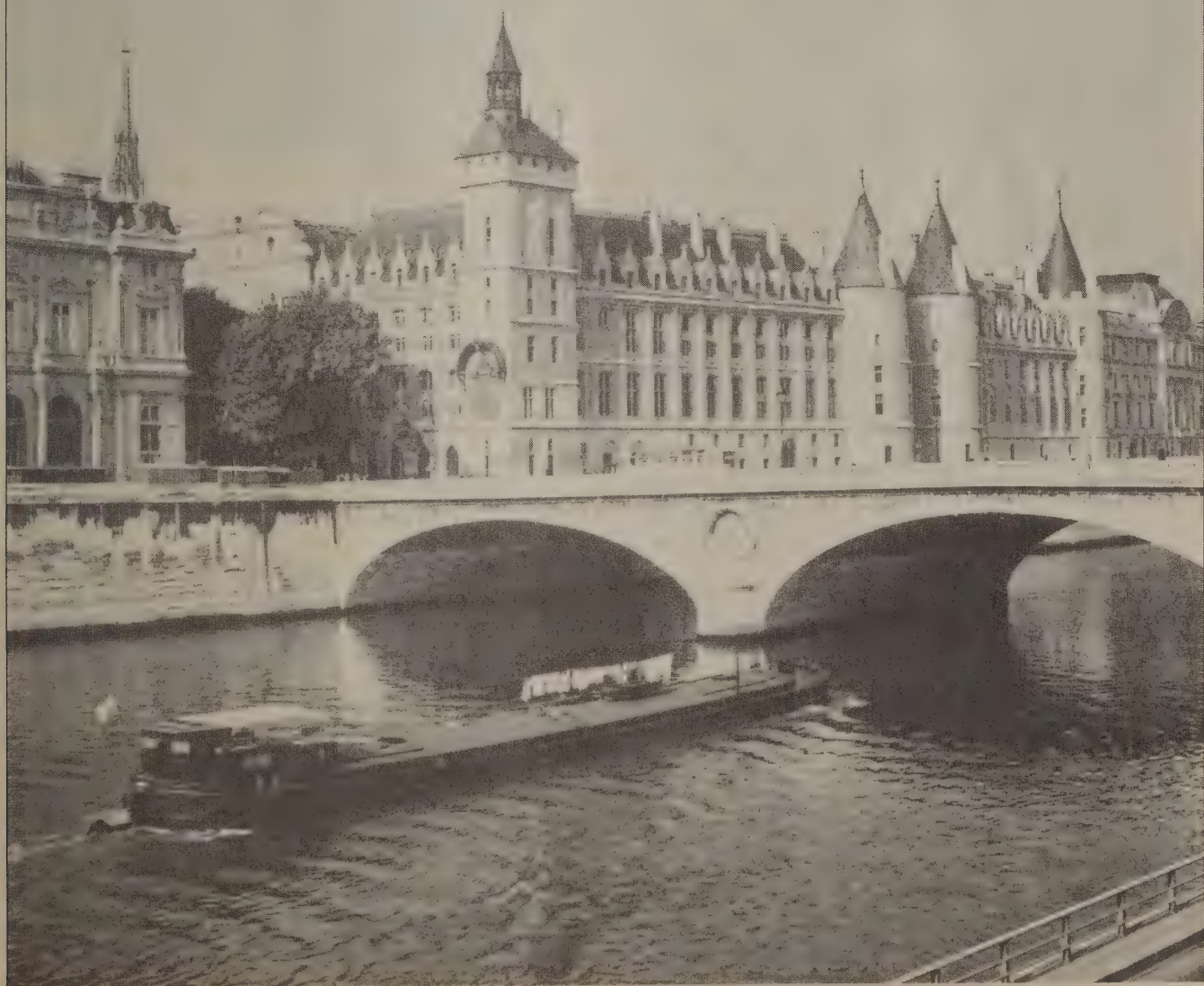
Consumer research underscores the American public’s craving for full-length, uncut feature films. From the classics of the ’30s and ’40s through the blockbuster hits released just weeks after their availability in video stores, the daily offering of movies is really unequaled anywhere. Let’s take a look.

DirecTicket is the name for the 40- to 60-channel allocation given to recent hit movies offered for \$2.99 per showing. In cable parlance, these “pay-per-view” movies are shown at convenient start times every half-hour, 24 hours a day. If you’re waiting to watch *Mrs. Doubtfire* in its premiere week, the movie will play at 8 p.m., 8:30, 9 p.m. and 9:30. With each start time on the half hour, a differ-

continued on page 32



Hidden Channels—You may not have seen these on cable. The Travel Channel (below) features experiences around the world. The History Channel (top left) explores the secret underpinning of German power in this century. Lions are from a National Geographic special.



ent channel plays the entire movie. The same title will also be played on a half-hour start later in the month, then possibly once every hour as the premiere month ends. DIRECTV plans to offer older titles for as little as \$1 per showing.

DirecTicket also covers other types of pay-per-view offerings, like sporting events and concerts. Soon, a special four-week trial of previously unavailable National Football League games may be sold on a test basis on DIRECTV.

For larger dishes, the current NFL offering allows viewers with C-band systems to purchase football games each Sunday. (The catch is that you have to be in an area where the game otherwise would not be shown.) This package covers the entire regular season, and allows the viewer a choice of any of 10 matchups played each Sunday. The entire season packages sells for under \$100.

A similar package is in the offing for the National Basketball Association season. Many of these games will be shown on one or more of the 15 regional sports channels. Other games not available in these packages may be purchased on a per-game basis for less than \$1 each.

For the fall college football season, a \$59.95 college ticket was marketed, offering several Saturday games from ABC and ESPN. These college games are not the same as ABC's national lineup, but offer powerhouse matchups enabling viewers to enhance their sports options.

Not Pay-Per-View

And, of course, as part of the basic monthly package, DIRECTV offers several full-time sports channels, including ESPN and the new ESPN2 (targeted at the younger TV viewer, offering more diverse sporting coverage, not as oriented to Major League, competitive play). ESPN has signed a big package with the National Hockey League next season and also selected Major League Baseball games.

Turner Broadcasting's TNT and the Superstation TBS are both highly committed to offering sporting events, most notably TNT's coverage of the NBA, along with early and late-season NFL action. TBS is home to the almost-champion Atlanta Braves, and viewers can watch more than 100 games in a season.

Movies, Movies, Movies

The grand-daddy of uncut, noncommercial movies and special fare, HBO, is now available in five versions. Most cable companies only offer the national "feed," or HBO1, version. (Feed refers to the uplink of the signal. HBO offers many different uplinks, or feeds, simultaneously.) The new HBO2 and HBO3 feeds are specially reprogrammed ver-

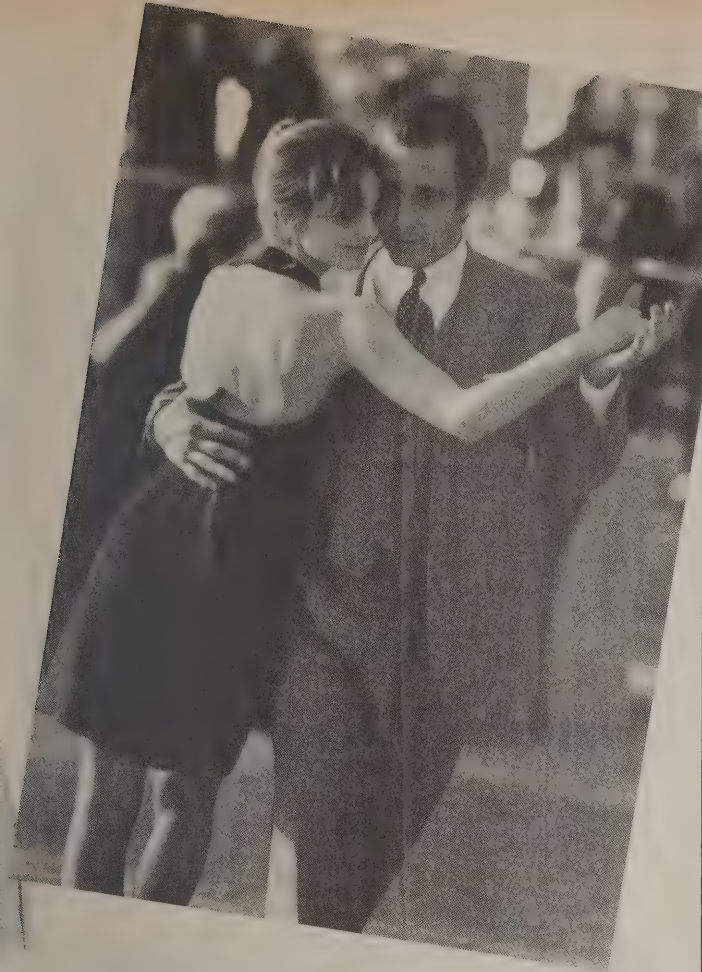


sions of movies and original programming from the huge supply of HBO offerings. The multi-channel, or multiplex, five-channel feeds are available at the same price as a single feed of HBO or Showtime from a cable company, typically at between \$10 and \$12.

HBO's companion service, Cinemax, specializes in recent hit movies shown on a convenient schedule. Each night has a different theme: one night devoted to action films, another to romance. Each Friday night, Cinemax debuts a new, recently released title.

Showtime, the Movie Channel and FLIX are all owned by the Viacom Enterprise Company, which recently bought out Paramount Communications. With extensive Hollywood-movie buying power, Showtime generally competes with HBO to purchase studio hits. On the DIRECTV lineup, Showtime offers three multiplexed channels—again, typically for same price as one feed on cable. The companion channel to Showtime is The Movie Channel, and the service's two satellite feeds specialize in an all-movie format. The third movie offering, FLIX, is a single-channel service devoted to showing classic films from the '60s, '70s and '80s.

The multi-channel or multiplex services of HBO,



Movies Galore—Encore features seven genre channels featuring: love stories, westerns, mystery, action, true stories and drama.

Showtime and Cinemax available on satellite are at the same price as just one premium channel through your local cable company. While, due to channel-capacity constraints, these multiplex feeds are generally not available except in the larger metropolitan cable markets, the multiplex channels are a more convenient way of scheduling your own viewing times. Although there is extensive duplication of hit titles, the multiplex services add a convenient way to choose among many different types of specials, movies and original programs. The monthly cost of premium channels is typically \$9.95 to \$10.95 each, but less when two or more are purchased at the same time. (See the USSB multiplex lineup below.)

Encore's Mini-Channel Approach

The Encore package of eight channels is a unique, new offering which adds a different dimension to movie and themed programming. The original Encore channel, like the FLIX service from Showtime, offers a low-cost alternative to the major premium services like HBO and Showtime. Encore offers hit movies of the '60s, '70s and '80s. Some typical titles showing on the service in November 1994 include *Ben Hur*, *The China Syndrome*, *Peggy Sue Got Married*, *Postcards From The Edge* and *The Sand Pebbles*.

STARZ! is the Encore-backed service which will present newer hit titles, in direct competition with HBO and Showtime. In 1995, STARZ! will exclusively show the 1994 Academy Award-winner for Best Picture, *Schindler's List*. In November, STARZ! will have several exclusives, including *The Piano*, *Carlito's Way*, *Mad Dogs And Glory* and *The Real McCoy*. Other special events include some original *Kukla*, *Fran and Ollie* TV shows, along with the environmental series, *Global Family*.

The new thematic channels from Encore feature a stocked film library of some 4,800 titles and an additional 3,500 television series. The many recent releases, vintage classics, and made-for-television series and mini series are divided up over six specialized channels. The five genres playing 24-hours-per-day, uncut movies are: Encore 2 (Love Stories; Encore 3 (Westerns), Encore 4 (Mysteries); Encore 5 (Action Movies); and Encore 6 (True Stories And Dramas).

A totally new channel from Encore is WAM: America's Youth Network. This channel is targeted at viewers from eight to 14 years of age, and will feature some "Brat Pack" titles like *The Breakfast Club* and *Brenda Star*. *Beat That* is a series that shares the stories of kids facing today's challenges. *F.R.O.G.* is an entertaining science program. And *The Changing World* is a new-to-the-U.S. series that explores the cultural diversity of underdeveloped nations.

More Movie Fare

Also mining the extensive movie library which has been amassed, Turner Broadcasting earlier this year debuted Turner Classic Movies (TCM). This collection of cinema gems includes the Golden Age of Hollywood, with the likes of Humphrey Bogart, Edward G. Robinson, Bette Davis, Jimmy Stewart and Rita Hayworth et al. TCM is joined by Turner's other very popular networks: WTBS, home of many contemporary titles; and Turner Network Television, which presents original productions and special events, along with a healthy dose of Major League sports.

The Disney Channel is synonymous with blockbuster family entertainment, and each month a special, recently released Disney movie is showcased. Hits like *Beauty And The Beast* and *Hocus Pocus* are part of the family fare. Also included are special programs for adults each evening, when the children (most, anyway) are in bed. There are two satellite feeds of The Disney Channel.

Other, General-Interest Programming

Premiering on DIRECTV are several totally new services to the U.S. viewing public. In addition, of course, are the 40 basic channels offered by DIRECTV, many of them familiar to former cable subscribers, while others like The Cartoon Network, Sci-Fi Channel, CourtTV and CNBC have only limited cable coverage.

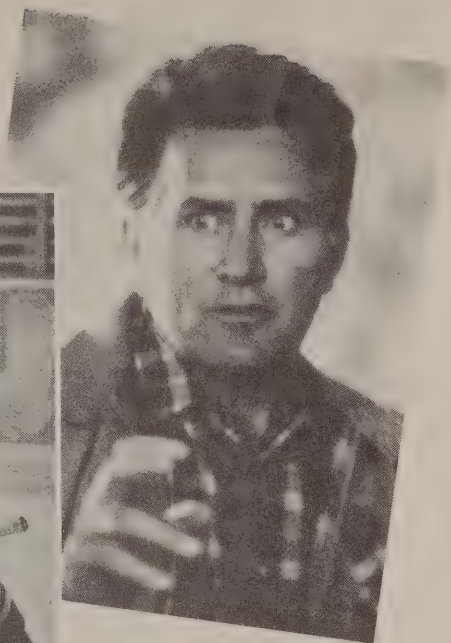
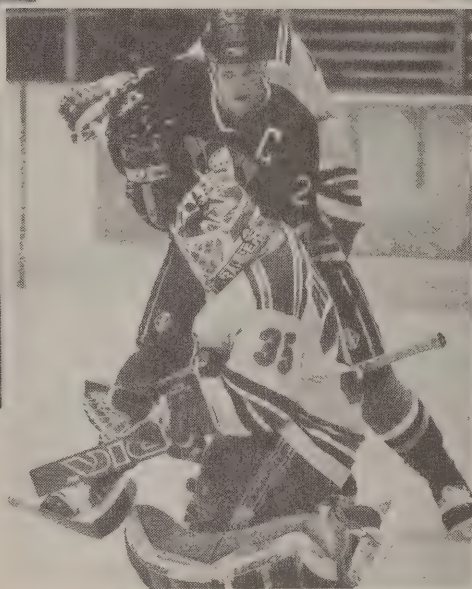
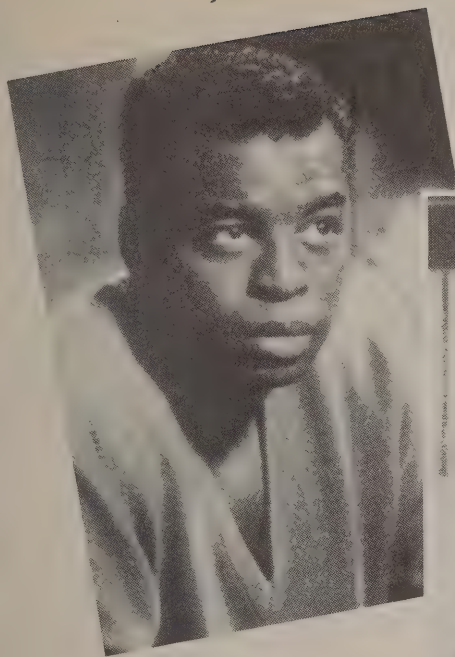
continued on page 80

What You Can Receive

**Two Distinct Programming Sources
Offer You Tremendous Variety**



Sports And Movies—
*ESPN (center) plus 16
 regional sports channels for
 special sporting events plus
 three separate, simultaneous
 Showtime channels often
 featuring stars such as
 LeVar Burton (left)
 and Martin Sheen (right).*



by Tony Gomez

There are new birds in the sky. "Birds," in the lingo of broadcasters, are manmade satellites. And the new ones are for the Digital Satellite System (DSS). Of course, we've had "birds" up there for a long time and there's nothing new in the concept of satellite broadcasting for home use. What is different now, however, is that this new system is technologically superior to conventional satellite systems or even cable TV. And the most obvious difference of all? It only requires a tiny home dish to be received!

The New Direct-Broadcast System

The Digital Satellite System is the direct-broadcast satellite alternative (to the existing large-dish C-band systems currently in use, as well as to the cable television now piped into 100 million homes). DSS is a new, state-of-the-art, digital, television

entertainment service being launched in North America by Thomson Consumer Electronics (RCA), DIRECTV (a division of GM Hughes Electronics) and USSB (United States Satellite Broadcasting). It has tremendous advantages over the conventional, analog system: lower cost, convenient size and installation, user-friendly viewing and the very latest in digital processing for high-quality video and stereo audio. Because DSS is a digital system, advanced concepts such as 16x9 wide-screen-format video and HDTV (high-definition television) can be implemented with relatively simple changes to the orbiting transponders.

Programming For DSS

Of course, having the greatest television set in the world wouldn't be worth a thing if there weren't any

continued on next page

It's no secret that, in every city where the DSS system has been introduced, it has sold out. The two programmers (USSB and DIRECTV), together, offer virtually every premium channel you'd want to see on television—for less!//



USSB Subscription Programming Information

USSB's programming lineup includes some of America's favorite networks and a variety of top-quality programming for each family member. Packages are priced to ensure a good value and flexibility for subscribers. A variety of payment options are available on all packages, allowing maximum convenience for subscribers.

USSB Entertainment Plus (\$34.95/month)

- HBO, HBO2, HBO3, HBO West, HBO2 West
- Showtime, Showtime 2, Showtime West
- Cinemax, Cinemax2, Cinemax West
- The Movie Channel, The Movie Channel West
- FLIX
- Lifetime, Nickelodeon/Nick at Nite, MTV, VH-1, Comedy Central, All News Channel

HBO Plus (\$24.95/month)

- HBO, HBO2, HBO3, HBO West, HBO2 West
- Cinemax, Cinemax2, Cinemax West
- The Movie Channel, The Movie Channel West
- FLIX
- Lifetime, Nickelodeon/Nick at Nite, MTV, VH-1, Comedy Central, All News Channel

Showtime Plus (\$24.95/month)

- Showtime, Showtime 2, Showtime West
- The Movie Channel, The Movie Channel West
- FLIX
- Lifetime, Nickelodeon/Nick at Nite, MTV, VH-1, Comedy Central, All News Channel

HBO Package (\$10.95/month)

- HBO, HBO2, HBO3, HBO West, HBO2 West

Showtime Package (\$10.95/month)

- Showtime, Showtime 2, Showtime West

USSB Essentials™ (\$7.95/month)

- Lifetime, Nickelodeon/Nick at Nite, MTV, VH-1, Comedy Central, All News Channel

What You Can Receive from page 35

programs available for it. And programming is what makes the difference in the DSS system. Two different programming sources are available: USSB and DIRECTV. These two services are complementary and do not overlap. This gives the DSS user the utmost in viewing flexibility.

USSB

USSB, a subsidiary of Hubbard Broadcasting, paid GM Hughes in excess of \$100 million for a five-transponder payload on the first of two GM Hughes satellites built for DIRECTV (see below). The agreement provides USSB with access to the digital-compression and -encryption technology that Hughes developed for its DBS programming service.

USSB offers viewers simultaneous, multi-channel versions of the most popular premium services: five different channels of HBO, three of Showtime, three of Cinemax and two of The Movie Channel and FLIX, as well as a hand-picked selection of six basic channels: Lifetime, Comedy Central, Nickelodeon/Nick at Nite, MTV, VH-1 and The All-News Channel.

USSB programming subscriptions range from \$7.95 (the "Essentials" package of six channels of basic programming) to \$34.95 per month (the "Entertainment-Plus" package, which includes all multi-channel options and basic channels).

Viewers of the Entertainment-Plus package would have the option of watching 14 different premium channels, and the six essentials channels at the same time! This is unprecedented for premium-channel viewing.

Showtime- or HBO-only packages are also available, with or without the Essentials package. "HBO Plus" (the enhanced HBO package, including Essentials) or "Showtime Plus" (the enhanced Showtime package, including Essentials) are each available for \$24.95 per month.

DIRECTV

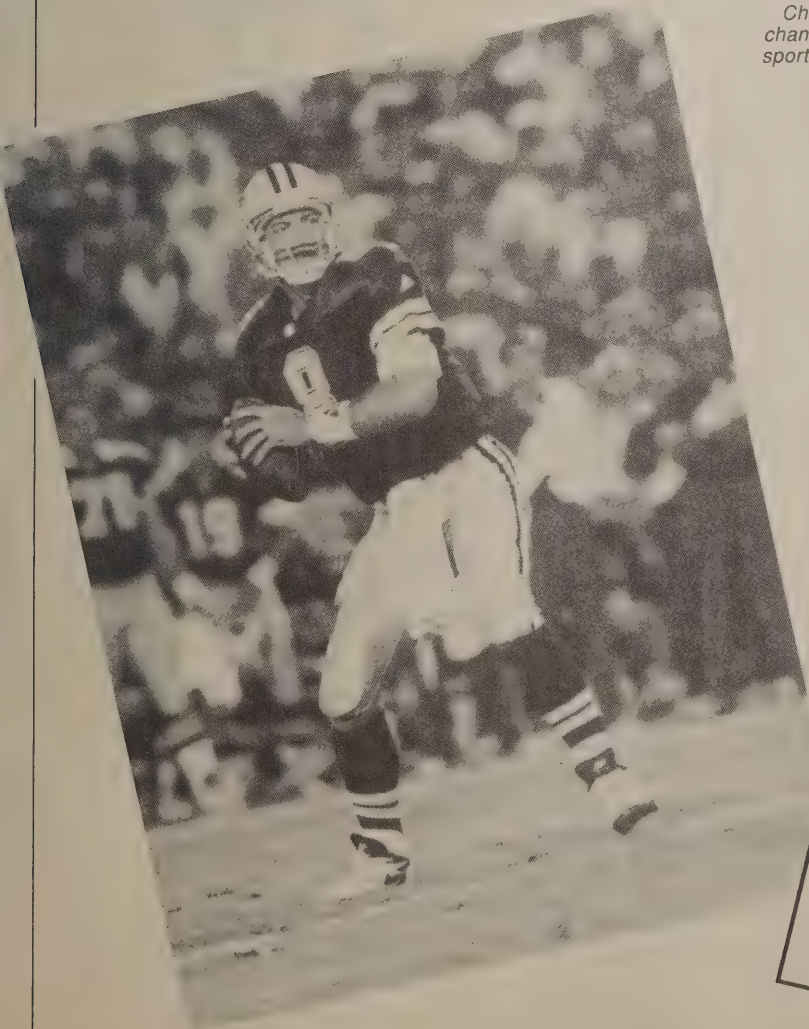
DIRECTV is a unit of GM Hughes Electronics, and is the largest high-power, direct-broadcast satellite-service provider available to consumers in the U.S. It delivers up to 150 channels of movies, sports, entertainment and informational programming directly to your home, via DSS.

DIRECTV began more than four years ago when GM Hughes, one of the nation's largest defense-electronics contractors, created a separate operating unit and invested more than \$600 million to enter the consumer-entertainment program-distribution business.

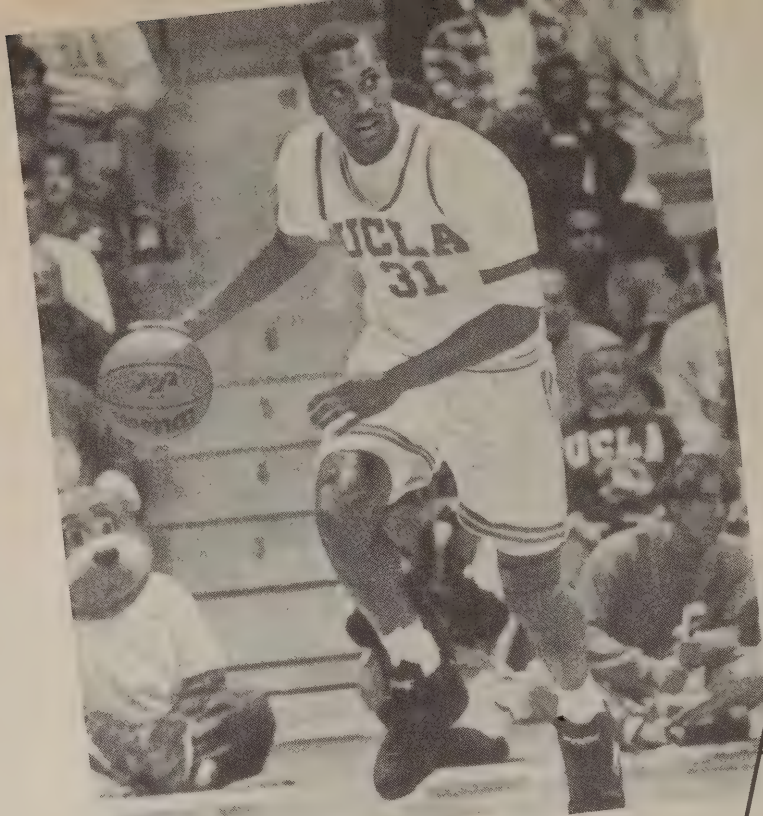
According to Eddy W. Hartenstein, president of DIRECTV, "In four years, we have designed and



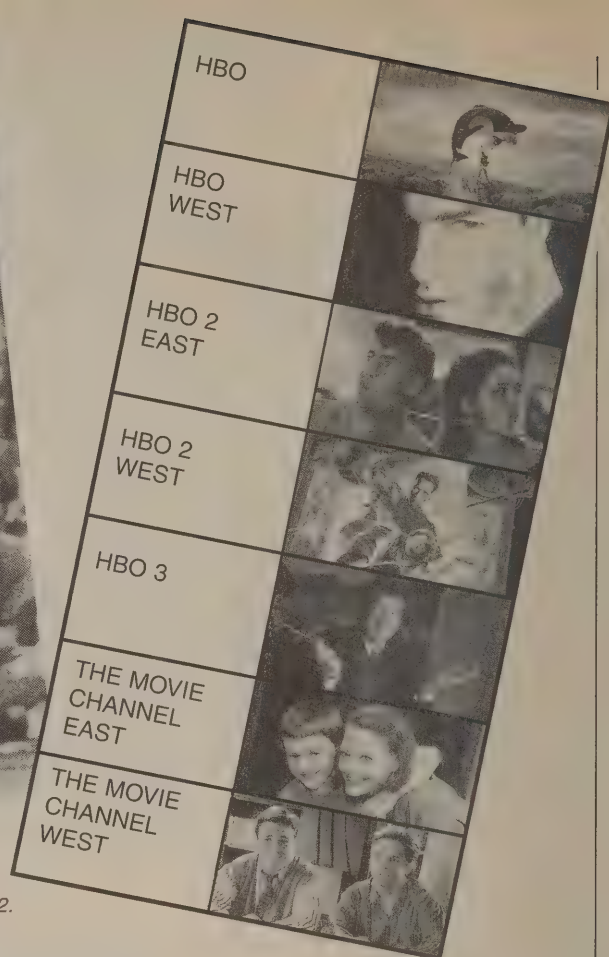
Programming Battles—USSB offers Showtime (bottom), The Movie Channel, HBO and Cinemax channels, while DIRECTV offers sports including ESPN channels.



SHOWTIME EAST	
SHOWTIME WEST	
SHOWTIME 2	
CINEMAX EAST	
CINEMAX WEST	
CINEMAX 2	
FLIX	



Basketball Action—
Featured on ESPN's
NCAA, available on
ESPN/Alternate or ESPN 2.



What You Can Receive from page 36

assembled the complete infrastructure required to deliver 150 channels of television programming to every home in the continental United States. A new era in home entertainment is now ready to begin: an era of programming choice, all-digital picture and sound quality, and tremendous entertainment value."

In late 1993 DIRECTV launched its first GM Hughes-built satellite, DBS-1, and completed the CRBC in Castle Rock, Colorado. (*See related story—Editor.*) The second satellite, DBS-2, was launched late July of this year. Between the two, they provide high-power, satellite, direct broadcasting to your home, using a tiny "dish."

DIRECTV offers two different program services. "Personal Choice" (\$21.95/month) offers the following:

- The Disney Channel
- ESPN
- The Cartoon Network
- CNN
- USA Network
- TRIO
- Headline News
- The Discovery Channel
- C-SPAN
- TNT
- Superstation TBS
- The Nashville Network
- Turner Classic Movies
- Bloomberg Direct

• MuchMusic

In addition, customers can select any 10 additional channels from the following:

- The Weather Channel
- Newsworld International
- E! Entertainment Television
- The Sci-Fi Channel
- Court TV
- The Family Channel
- The Travel Channel
- C-SPAN-2
- CNN International
- The Learning Channel
- Arts & Entertainment
- CNBC
- Country Music Television
- and others yet to be announced.

Or you can select the "Encore Movie Multiplex," which consists of:

- Encore
- Encore 2—Love Stories
- Encore 3—Westerns
- Encore 4—Mystery
- Encore 5—Twins
- Encore 6—Action
- Encore 7—True Stories and Drama.

Also, 30 CD-quality, formatted music channels are available free.

DIRECTV users get a \$2.50 coupon for use to-

continued on page 40

DBS IS HAPPENING

In 1995, U.S. DBS sales will reach one million. Find out why!

Session 1:

Satellites 101-
Understanding
the DBS
System

Session 2:

A Global View
DTH in Asia,
Europe, Latin
America, and
Canada

Session 3:

A DBS
Financial Model
How Many?
How Soon?

**DBS
95**

Dec. 2, 1994 • Anaheim, CA

Anaheim Marriot Dec. 2, 1994

(FOLLOWING THE WESTERN CABLE SHOW)



The First Million

Programming
in The DBS
Universe:
Basic, Pay,
New, and Niche

Systems
DirecTV - USSB
PrimeStar
Echo/C-Band
and live
demonstrations

Session 8:

The Consumer
Interface:
Marketing For
Hardware and
Software Sales

**DBS
95**

MAIL TO:

DBS DIGEST

P.O. BOX 1482

ENGLEWOOD, CO 80150

PHONE: 800-683-6918

OR 303-788-1400

DBS '95 Is Sponsored by DBS Digest and DTUG International

\$445 Early Registration (Made By Oct. 21st)

CALL TO SAVE YOUR SPOT: 303-788-1400,

FAX TO: 303-797-7201

DBS '95: The First Million

Conference registration includes
all sessions, keynote luncheon,
demonstrations, workshops, conference
manual, and cocktail reception.

Billing option will be invoiced once
and is due prior to Nov. 2. Payments
in U.S. funds.

☐ \$495 Full Registration

☐ \$445 Early Discount *paid by Oct. 29*

☐ \$425 Team Discount for two or
more persons from the same
company registered at the same
time.

NAME

TITLE

COMPANY

ADDRESS

CITY

STATE

ZIP

COUNTRY

PHONE

FAX

PURCHASE ORDER# _____ (PAYABLE UPON RECEIPT)

☐ CHECK

NUMBER _____

☐ AMERICAN EXPRESS

NAME ON CARD _____

☐ MASTERCARD

EXPIRES _____

☐ VISA

SIGNATURE _____



More Sports—Live-action boxing (right) from ESPN Sports Center (above). Right are CNN sports anchors Fred Hickman and Nick Charles.



Subscription Programming Information

PERSONAL CHOICE

29+ Channels For Just \$21.95 Per Month:

- ESPN
- CNN
- TRIO
- The Discovery Channel
- TNT
- The Nashville Network
- Bloomberg Direct
- The Cartoon Network
- USA Network
- Headline News
- C-SPAN
- Superstation TBS
- Turner Classic Movies

And Choose 10 More From The Following:

- The Weather Channel
- E! Entertainment TV
- Court-TV
- The Travel Channel
- CNN International
- A&E
- Country Music Television
- Newsworld International
- The Sci-Fi Channel
- The Family Channel
- C-SPAN 2
- The Learning Channel
- CNBC
- Others to be announced!

Or Select The Encore Multiplex:

- ENCORE
- Love Stories—ENCORE 2
- Westerns—ENCORE 3
- Tweens—ENCORE 4
- Mystery—ENCORE 5
- Action—ENCORE 6
- True Stories & Drama—ENCORE 7

And This \$250/Year Value At No Extra Cost:

- The Disney Channel
- Music Choice: A selection of 30 CD-quality music channels in a variety of formats
- A \$3.95 per month coupon for Direct Ticket movies and special events

Plus:

- À la carte subscription services like Playboy TV at \$3.95 to \$9.95/month
- Access to Direct Ticket movies and special events

What You Can Receive from page 38

ward the first Direct Ticket (a pay-per-view service) each month. With DIRECTV's "Direct Ticket Pay-Per-View" you can choose from up to 40 channels of Hollywood motion pictures, sports and special events with box-office hits available long before they appear on the cable channels.

"Total Choice" offers every DIRECTV service listed above for \$29.95/month.

À la carte services include Playboy TV for \$9.95/month and PrimeTime 24, a national news feed for areas not served by local or cable programming.

What's remarkable is that you can see these features almost any time you want; they repeat, with starting times about every 30 minutes!

Local Broadcast Alternatives

The one service that neither USSB nor DIRECTV provides is broadcasts from "local" television stations—either over the air or through a cable system. This unavailability of local service on the DSS system is the result of the federal Satellite Home Viewing Act of 1988. To work around this, the DSS receiver has a built-in TV/DSS source switch. The "TV" selection is for local, over-the-air or cable service; "DSS" is for DSS programming.

In short, instead of paying your cable company for premium channels, you can now subscribe for



only the minimum service. This will bring in the local stations. And you can use DSS for all the premium channels. (Of course, if you're located close to TV stations, you can also simply use an antenna to get local broadcasts.)

To reiterate, to get the maximum benefit of both a cable service and the DSS system, the cable service should be reduced to an absolute minimum, as noted—the so-called “Lifeline” service. This service generally covers only national television-network broadcasts and local TV broadcasts and is generally available at a greatly reduced rate. There should be no need to keep your cable-TV premium service, since the DSS can provide more premium service than your cable TV system can possibly offer, and for significantly less money. (If your local cable service does not offer a “Lifeline” service, you should reduce your cable service to the least-expensive service offered that provides local programming. If that reduced service also includes channels also offered by either DIRECTV or USSB, adjust your DSS programming selections accordingly.)

Unique Features Of The DSS Interactive Program Menus

The DSS Program Guide is like having your own personal satellite-TV version of *TV Guide*. It lists

continued on page 44

TOTAL CHOICE

38+ Channels For Just \$29.95 Per Month:

- ESPN
- CNN
- The Weather Channel
- The Discovery Channel
- TNT
- Newsworld International
- Turner Classic Movies
- The Family Channel
- C-SPAN
- The Nashville Network
- Headline News
- C-SPAN 2
- CNBC
- Others to be announced!
- The Cartoon Network
- USA Network
- Superstation TBS
- Country Music Television
- Court TV
- The Travel Channel
- CNN International
- E! Entertainment TV
- TRIO
- The Sci-Fi Channel
- The Learning Channel
- A&E
- Bloomberg Direct

And This \$300/Year Value At No Extra Cost:

- The Disney Channel
- Music Choice: A selection of 30 CD-quality music channels in a variety of formats
- Two \$3.95 per month coupons for Direct Ticket movies and special events
- The ENCORE Multiplex:

ENCORE	Tweens—ENCORE 4
Love Stories—ENCORE 2	Mystery—ENCORE 6
Westerns—ENCORE 3	True Stories & Drama—ENCORE

Plus:

- A la carte subscription services like Playboy TV at \$3.95 to \$9.95/month
- Access to Direct Ticket movies and special events

"When the history books are written for the 20th century, ...direct home reception of satellite television will emerge as having had an effect equal to that of the automobile."

H. Taylor Howard
Prof. Emeritus, Stanford University

The Era of Direct Broadcast Satellites

Satellite technology is changing our world rapidly and decisively.

People who are involved in broadcasting, communications, and electronics need a basic understanding of satellites, their uses and technologies.

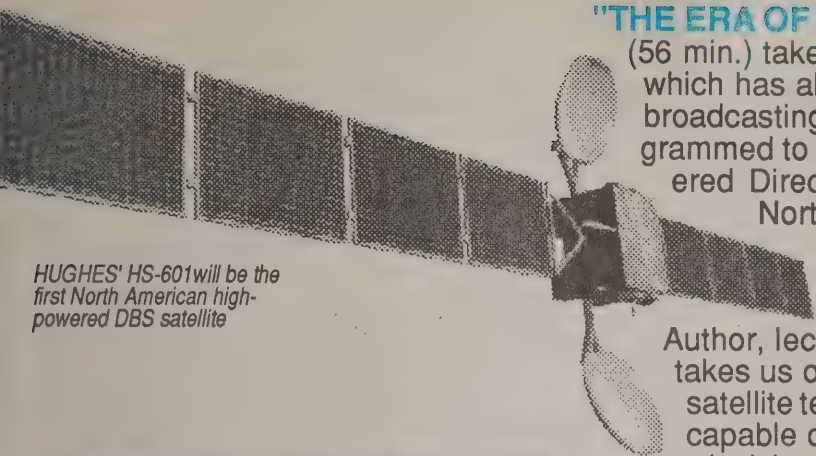
The **Shelburne Satellite Series** videotapes are designed to make learning about satellites easy and interesting.

"THE ERA OF DIRECT BROADCAST SATELLITES"

takes a comprehensive look at the DBS satellites that are already at work around the globe and at the high-powered DBS satellites that will soon be coming to North America.

"THE ERA OF DIRECT BROADCAST SATELLITES" is a 56 minute overview of this fascinating new technology -- what it is, where it came from and where it is going -- including a close-up look at the world's first fully operational DBS systems. Author and lecturer, Mark Long, an internationally recognized expert on global satellite communications, leads us on this trip into the fascinating world of direct-to-home, high-powered, satellite television communications.

Let the Shelburne Satellite Series videotapes complete your education program with general and technical information about communication satellites and how they work.



HUGHES' HS-601 will be the first North American high-powered DBS satellite

"THE ERA OF DIRECT BROADCAST SATELLITES"

(56 min.) takes a look into the new satellite technology which has already become a major force in television broadcasting around the world. Designed and programmed to reach the home viewer directly, high powered Direct Broadcast Satellites will be coming to North America very soon. The British call it DTH, or direct to home satellite broadcasting.

Author, lecturer, and industry consultant, Mark Long takes us on an exploration of today's most powerful satellite technology, DBS. Each DBS satellite will be capable of beaming over one hundred channels of television to tiny 1 to 2 foot dishes and small flat plate "collectors".



Mark Long takes a close look at the tiny satellite dishes already in use in Europe and Japan in "THE ERA OF DIRECT BROADCAST SATELLITES"

High satellite power levels will combine with new video compression technologies to bring about an entertainment revolution. For a complete understanding of what these souped-up satellite services will be like, we take a trip to England, Japan and Australia to see DBS services already in operation.

Mark Long visits with leading experts involved in both the development and marketing of DBS services. He takes us through the history of home satellite television, meeting some of the earliest "pioneers" and key players in the development of the satellite industry, like writer Arthur C. Clarke, who discovered the stationary orbit belt; Steven Birkill, who built the first home satellite receiving system in the world; Taylor Howard the Stanford professor who built the first home earth station in America; and Bob Cooper, who started and directed the C-band home satellite revolution of the '80s.

"The Era of Direct Broadcast Satellites" covers:

- The History of Home Satellite TV
- Satellite Fundamentals
- Frequencies & Orbital Assignments
- An Inside View of A Satellite Payload
 - Electrical Power Subsystem
 - Electronic Communications Subsys.
 - Satellite Antenna Subsystem
- DBS In America: The First Time Around
- Interim Medium Powered DBS Services
- High Power DBS: The Second Time Around
 - RARC Plan, Future Operators
- Satellite Receiving Systems: Equipment
 - Antennas & Feedhorns
 - Low Noise Block Downconverters
 - Receivers
 - Descramblers
- DBS Around the World (Europe, Japan and Australia)

"THE ERA OF DIRECT BROADCAST SATELLITES"

VHS -- NTSC (North America & Japan).....	\$149.00
VHS -- PAL (Europe).....	179.00
Add Shipping & Handling:.....	\$3.50



SHELBURNE FILMS

54545 S.R. 681
Reedsville, Ohio 45772
614-378-6297

PURCHASE ORDERS ACCEPTED

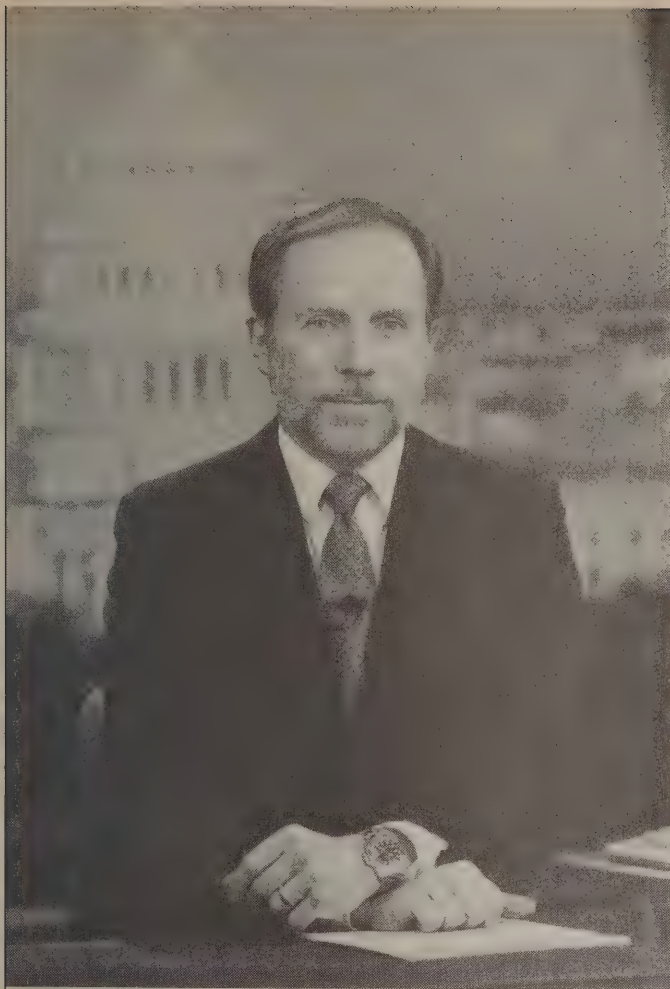
Visa • Mastercard • American Express

Additional titles in the Shelburne Satellite Series include: "The World at 12 Gigahertz" (60 min.), "Installing Satellite Antennas" (31 min.), "Satellite TV Basics" (14 min.) and "Satellite Magic" (12 min.).



Digital Clarity—
"National Geographic Explorer" (top) takes you to Africa. With an S-Video TV set, you can see it with amazing sharpness. Below is "Baseball Tonight" host Chris Myers (left) and analyst Jim Kaat.





News And Entertainment—Charles Bierbauer of CNN (top), Showtime's "Parallel Lives" "actors. Networks are available on DSS, but only in areas not already served by local stations.



What You Can Receive from page 41

every program service available to you by time, date, channel and program content.

The Program Guide is controlled by the DSS remote control. Because of the wealth of programming available, a Filters feature allows the program guide to be custom-tailored to your liking, presenting you with only those preferences.

It's possible to create two different preferred lists: Favorite List A and Favorite List B.

Parental control of your lists can come from a variety of ways: "Parent-Approved" will allow younger viewers to watch programming you have selected. In addition, a rating limit can be applied to program content: PG-13, NR, R, NR-Mature or NC-17.

More importantly, the spending limit is entered by you to indicate the maximum you will spend for any pay-per-view service.

Alternate audio channels (in English, Spanish, French, German, Italian, etc.) are also available for certain programs broadcast in a foreign language. Help menus are available for all aspects of the DSS system—from the use of the remote control, to front- and backpanel hookup procedures, to the programming features. There is also a unique DSS Mailbox feature for receiving messages (Happy Birthday, etc.) from your DSS program providers.

Conclusion

The merits of the Digital Satellite System are obvious. You now have unprecedented freedom to enjoy a cornucopia of entertainment programming beamed direct to your home—with quality, flexibility, convenience and affordability that far exceed what cable service or even conventional satellite reception can offer. Video-image quality is comparable to laser videodisc, with audio quality equal to that of CD digital audio. Furthermore, being digital by design, DSS stands ready to be the first wide-screen/HDTV programming service available to North America, when such TV sets become generally available.

It's no secret that, in every city where the DSS system has been introduced to so far this year, the product has completely sold out. The response has been phenomenal, and rightfully so.

If you've been hopelessly searching for your on-ramp to the much-hyped Information Superhighway, be aware that it may not be a commercially viable solution for some years to come. And digital TV programming for these Information Superhighway sources will take even longer, conservatively estimated at five to 10 years! The Digital Satellite System, using new DBS digital satellite technology and interactive programming features, on the other hand, is here *now!* 🍷

DIRECTV: 800-DIRECTV/USSB: 800-204-8772



From Broadcast Antennas To Small Dishes In Only 20 Years

THE Home Satellite Revolution

J.K. Dormer

When many people first hear about catching satellite signals in their own backyards and viewing them in the convenience and privacy of their own TV rooms, they find the whole idea fascinating and perhaps a bit awe-inspiring. There is a certain mystique about these advanced new technologies, or "high techs." But it's really not all that hard to understand. In the next few paragraphs I will help you pierce that veil of mystery, as we look into the world of satellite television, how it works and what it takes to navigate in it.

Most Americans are quite familiar with the U.S. space effort. Many of us followed its development as we grew up. We have had the opportunity to watch the space shuttle on the evening news, as it launches and even retrieves communications satellites. These amazing and spectacular views from space not only acquaint us with space technology, but also give us a bird's-eye view of the earth below. From this lofty angle it becomes easier to realize how a satellite, acting like a radio or TV transmitter, can blanket the earth below with its signal.

The traditional way of distributing television networks has been through a series of microwave relay towers stretched across the land. A single satellite now replaces these many thousands of ground-based relay stations. While hills and terrain, even sheer distance, will block terrestrial transmissions, almost any location on the ground can look up and "see" a satellite.

The extraordinary idea of using manmade satellites to beam television and other communications to the far reaches of the world, as well as the many benefits this would bestow upon us, was first envisioned by the British mathematician and science-fiction writer Arthur C. Clarke. In an article appearing in the October 1945 issue of *Wireless World Magazine*, he postulated that if a satellite were positioned high enough above the earth's equator, its orbiting speed could be matched to the rotation of the earth. To earthbound observers, the satellite would appear to remain fixed in one particular spot in the sky.

His theories have since become reality. Today, ringing the earth, are an ever-increasing number of these "geosynchronous" satellites, providing service to millions of people from many different countries all around the world. The satellites orbit 22,300 miles above the equator, in what is now referred to as the Clarke Belt in recognition of Clarke's pioneering vision.

Enter The World Of Video Entertainment

It was only a little over 20 years ago that Western Union began operating America's first geosynchronous satellite. It was primarily used for telephone and data transmissions, and only occasionally for television. In 1975 RCA launched the world's first 24-channel satellite and, that fall, the regional

continued on next page

pay TV service Home Box Office announced that it would offer its service to cable systems nationally, via this new "bird." Ted Turner followed a year later with his Atlanta UHF TV station, WTBS, which became the nation's first superstation. Today, there is a virtual potpourri of cable television programming networks being distributed via satellite. DSS is only the latest of these developments.

But how does it all work?

Moving The Birds Around

It's useful to keep in mind that, while these satellites were launched on rockets in a fiery trip into space, once out in the vast darkness, the propulsion systems drop away and their payloads, the satellites, are on their own when it comes to "parking" in their prescribed orbit. (There are so many satellites today in the Clarke Belt that, in some ways, it resembles a crowded parking lot!)

To move about, they use tiny chemical thrusters. Each satellite carries onboard enough propellant to last five to 10 years. When that's gone, the satellite usually comes drifting back, to burn up in the atmosphere.

By the way, while the satellites do have battery backup power, their main source of power is sunlight. Each satellite has an array of solar panels that convert energy from the sun into electricity. This is what powers the transponders.

What are they, you ask? The transponders are receivers, amplifiers and transmitters. They receive original television signals from uplink stations on the ground. Then they amplify the TV signals and retransmit them back to the ground, to be picked up on your home Digital Satellite System (DSS).

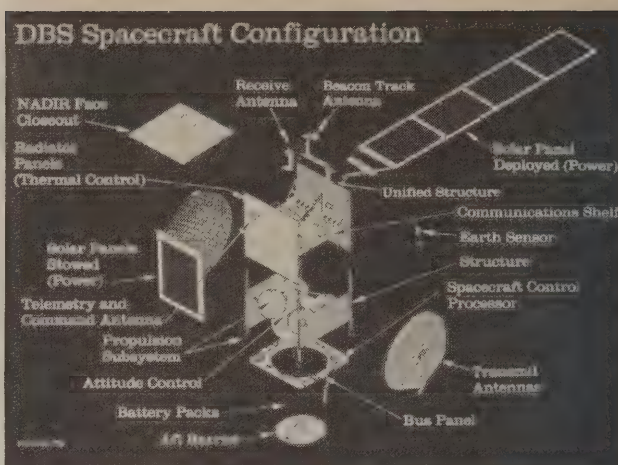
The area of the earth that is within the receiving range of the satellite is known as its footprint. For DSS, the footprint is the entire continental United States.

How Your Home System Works

The new Digital Satellite System, as you already know if you've read any of the other articles in this magazine, only requires an 18-inch dish to receive the signals. However, the operation of DSS is similar to how TV signals from space are received by the much larger, C-Band dishes. The following discussion, therefore, will apply to both.

When the signal from space reaches the dish, it is focused, or concentrated, toward a central point, where a feedhorn is located. This is simply a metal focusing device.

The key to reception is right behind the feedhorn: the LNA, or low-noise amplifier. Once the concentrated satellite signal is funnelled down inside the feedhorn, it encounters the LNA. The purpose of the LNA, as the name implies, is to amplify the weak microwave signal to a more usable level.



Within any electronic circuit a certain amount of noise is generated. Any noise created by the LNA circuitry itself will be amplified and passed on to succeeding stages. LNAs are rated by the "noise temperature," expressed in degrees Kelvin. The lower the temperature, the less noise is introduced into the LNA by its own circuitry, and the better it will perform. This is especially important when trying to receive a satellite signal that originates at only about 100 watts tens of thousands of miles away.

With the DSS system, the signal that's coming in is digital. That means that it works like a computer, rather than like a broadcast radio station. If you've worked with a computer, you know that copying a file from one disk to another is a "perfect" maneuver. In other words, every single bit of information is correctly copied so the file on the target disk is the exact duplicate of the file on the source disk.

Something similar happens in the DSS receiver. Theoretically, enough signal must be present so that every bit of the original video transmission can be reproduced on your television screen—a perfect duplicate of the original. That's the theory. However, in practice the huge amounts of transmission space and memory required make this impractical, so a video compression system is used. Without going into great detail, the signal is compressed, sent to the satellite, and decompressed at your receiver. The receiver has circuitry which will allow for a certain amount of error to creep in as part of the compression/decompression process.

Interference

While the reproduction of the digital system is presumably "perfect," that's only in theory. In real life, it's less so. It is affected by such things as clouds, rain, and windowpane glass. If any of these are present, the signal will weaken and if it weakens sufficiently, the video transmission will "hang up."

This is quite different from the problem that occurs when you're trying to receive TV via cable or conventional antenna and you're too far away from the source or the cable company drops its transmission power level. In this case, as I'm sure you've witnessed, the signal simply begins to fade

and get thin. The term "snow" applies here; a signal that's weak, sometimes too weak to be seen clearly. Additionally, another term, "ghost" refers to different images of the same picture seen when a weak signal bounces and comes into the receiver out of sync.

On a DSS system, you will never see snow or ghosts. Remember, it's "digital," which essentially means that either the picture is perfect, or there's no picture. And when there's too much interference, such as during a rain squall or snow storm or when you're trying to receive through a pane of glass, that's what happens. Suddenly the transmission halts or "hangs up." Part of the picture, say the top half, may still be clear, but the bottom half will look like a series of horizontal bars of different colors. The image will not move for a few moments. Then the picture will start again, until it hangs up, again. Hopefully, this won't happen very often.

Other Systems

PRIMESTAR uses a dish somewhat larger than the

DSS system and there are still millions of Americans who view satellite programming via C-band. (See the related story on C-band in this issue.)

C-band uses a different frequency from DBS and uses less powerful satellites (in the range of 15 watts as opposed to over 100 watts). As a result, the dish size must be larger, typically six to eight feet depending where you're located in the U.S.

What's important to understand, however, is that the operation of all the systems is essentially the same. The signal is created in a broadcast studio, "uplinked" by powerful transmitters and large dishes to satellite transponders, reamplified and sent back to earth where it is received on your home dish, amplified and put onto your television screen. The entire process, though covering tens of thousands of miles, takes only a few moments of time.

While the world of home satellite reception isn't quite as handy as simply receiving a phone call, it's quite impressive for what it can do. And this is really only the beginning! ☛

Here Are Some Satellite Dish Buzzwords To Add To Your Vocabulary

Aperture Beamwidth

Dish diameter. A 10-foot dish has an aperture of 10 feet. The beamwidth of a dish antenna is the angle of sky which can be illuminated (picked up or sent out) by the dish. Within that arc satellites can be seen from the TVRO dish. Large dishes have narrow beamwidths, which reduces noise from its sides. Small dishes have wider beamwidths, meaning that they are noisier but easier to aim.

C/N

Carrier-to-noise ratio. The ratio of the carrier strength measured in decibels. The higher the C/N, the higher the S/N and quality of the TV picture.

db and dBW

dB (decibels) is the standard unit for expressing relative power, voltage or current. dBW indicates actual power of one signal compared to a reference of 1 watt. In satellite dishes, an increase of 3dBW equals a doubling of gain.

Dish

Also dish antenna. Jargon for a parabolic reflector.

EIRP

Effective isotropic radiated power. A measure of the relative strength of the satellite TV signal expressed in dBW. EIRP figures are always strongest at the center of the boresight.

Feedhorn

The component mounted in front of a dish at the focal point that receives the reflected signal from the dish.

Footprint

The signal-strength map showing the EIRP contours of each signal as it is sent to earth from a satellite.

Gain

Increase in power. In satellite dishes, the gain is measured in dBW. A 3dB increase in gain equals a doubling in power.

LNA

Low-noise amplifier that boosts the satellite signal picked up by the earth-station dish. It is installed at a particular spot on the dish and is directly connected to the feedhorn.

Look Angle

Angle above the horizon at your location from which the satellite signal arrives.

Parabolic Reflector

An antenna with a specifically shaped reflector surface (logarithmic curve) to reflect all incoming parallel waves to a very small focal point. It works on a principle similar to that of the reflecting telescope.

VSWR (Voltage Standing Wave Ratio)

A measure of the efficiency of a signal interface, especially the impedance match of the antenna to the LNA.

by **Tony Gomez**

High in the clear, dry air of Castle Rock, Colorado, lies the world's first all-serial, digital, satellite-broadcast facility. The \$100 million Castle Rock Broadcast Center (CRBC) is the heart of DIRECTV broadcasts. It is from here that all of the broadcasting for the new DIRECTV system is "uplinked," or sent to the satellite from the ground.

Just how high-tech is this facility? For those who want the specs, listen up. In a two-story, 55,000-square-foot facility, the very latest in state-of-the-art video-production equipment is in use. Over 300 Sony Digital Betacam VCRs, for recording and playback of program material, are connected to a proprietary 512x512 output, serial, digital routing switcher to send programming throughout the complex. Over 2 million feet of audio and video cable interconnect the digital system. The bottom line is that Castle Rock offers a fully automated broadcast system capable of simultaneously processing up to 216 digital video and audio channels!

Where The Programming Comes From

The CRBC receives programming from three sources. First, there are dozens of satellites in orbit, already sending signals for a variety of free and premium channels. Castle Rock receives all of these. Second, some broadcasting sources are land based and Castle Rock receives these from fiber-optic land lines. Finally, of course, it receives and processes from digital Betacam videotape sent directly to it. (Digital program copies are then made and reviewed for the highest program-standard quality.)

How It Works

Broadcast-destined videotapes are loaded into a robotics-controlled playback system called PARS, which consists of 56 robotic Sony Flexicart systems housing 224 Sony Digital Betacam VCRs. These playback VCRs are, in turn, switched on air by a multi-channel automation system controlled by the DIRECTV scheduling department.

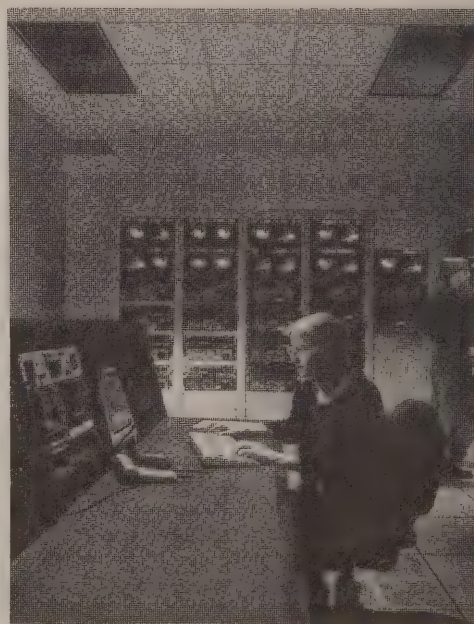
The Uplink Signal-Processing System (USPS) compresses the Betacam-video program information into the new MPEG (Motion-Picture Experts Group) full-motion, digital video standard, using Thomson (RCA)/CLI compression systems. It then encrypts the program information for security reasons, multiplexes the video and audio signals, and inserts the on-screen program-guide signal.

The Uplink RF System (URFS) converts the compressed, encrypted signals for direct transmission to the DBS-1 and DBS-2 satellites.

The CRBC operates 24 hours a day, has a staff of 150 operational and management personnel, and boasts complete emergency backup-power systems for uninterrupted service. ☐

LIVE... From Castle Rock

Where The Programming Comes From





Uplinking—DIRECTV's facilities include a technical studio (top) and a "dish farm" which sends the signal for dozens of channels to the DSS satellites, which then direct it to your home.

Basic Model DSS Digital Satellite System

RCA DS1120RW

Suggested Retail Price: \$699

Shipping Weight: 27 lbs.

RECEIVER

Model Number: DRD102RW

Frontpanel Control: 8-button.

Access Card: Yes.

Channel Capability: 150.

Audio/Video Jacks: Yes.

Power Requirements: 120V
AC $\pm 10\%$.

Power Consumption: 34W.

Connectors

- Satellite In: F-type.
- In From Antenna: F-type.
- Out To TV: F-type.
- Super Video: S-Video.
- Video: RCA-type.
- Right/Left Audio: RCA-type.
- Wide-Band Data: 15-pin D-type
- Low-Speed Data: N/A.
- Phone: Modular.

Dimensions

- Width: 15 in.
- Height: 2.875 in.
- Depth: 11 in.

Weight: 6 lbs.

Finish: Satin Gray.

REMOTE CONTROL

Model Number: CRK91A1

Infrared: Yes.

Number Of Buttons: 30.

Universal Operations:

- TV: Yes.
- VCR: N/A.
- Cable Box: N/A.
- Laserdisc Player: N/A.

Batteries: 4 AAA.

DISH

Model Number: DSA100RW

LNB Input Frequency:
12.2-12.7 GHz.

LNB Output Frequency:
950-1450 MHz.

LNB Polarity: Single, F-type.

LNB Feed: Circular.

Dimensions: 18x20-in. parabolic.

Weight: 10 lbs.

Finish: Satellite Gray.

Construction: Metal.

Your Two Digital Satellite System Choices



DSS

THE BASIC DSS SYSTEM

The Basic DSS System is an affordable way to start enjoying sharper picture, clearer sound and greater choice. This system includes a satellite receiver, unified remote control and compact, 18-inch dish antenna.

Satellite Receiver

- Compact design blends with other consumer electronics products.
- Eight-button frontpanel provides access to all system functions.
- S-Video output jack and video-output jacks for superior, digital picture quality.
- Two sets of right and left audio-output jacks for superior, digital-quality sound.
- Wide-band data port for high-definition TV, when it becomes available. (Additional equipment may be required.)
- Satellite input, antenna input and RF output.

Antenna Dish

- Small, compact 18-inch parabolic reflector is both lightweight and inconspicuous.
- Durable metallic construction.
- Dual-polarity, single-output design for single TV hookup.



Deluxe Model DSS Digital Satellite System

RCA DS2430RW

Suggested Retail Price: \$999

Shipping Weight: 27 lbs.

RECEIVER

Model Number: DRD203RW

Frontpanel Control: 8-button.

Access Card: Yes.

Channel Capability: 150.

Audio/Video Jacks: Yes, gold-plated.

Power Requirements: 120V AC $\pm 10\%$.

Power Consumption: 34W.

Connectors

- Satellite In: F-type.
- In From Antenna: F-type.
- Out To TV: F-type.
- Super Video: S-Video.
- Video: 2 RCA-type.
- Right/Left Audio: 4 RCA-type (2 pairs).
- Wide-Band Data: 15-pin D-type.
- Low-Speed Data: 9-pin D-type.
- Phone: Modular.

Dimensions

- Width: 15 in.
- Height: 2.875 in.
- Depth: 11 in.

Weight: 6 lbs.

Finish: Spatter Ebony.

REMOTE CONTROL

Model Number: CRK91B1

Infrared: Yes.

Number Of Buttons: 39.

Universal Operations:

- TV: Yes.
- VCR: Yes.
- Cable Box: Yes.
- Laserdisc Player: Yes.

Batteries: 4 AAA.

DISH

Model Number: DSA400RW

LNB Input Frequency: 12.2-12.7 GHz.

LNB Output Frequency: 950-1450 MHz.

LNB Polarity: Twin, F-type.

LNB Feed: Circular.

Dimensions: 18x20-in. parabolic.

Weight: 10 lbs.

Finish: Light Satellite Gray.

Construction: Metal with glass-reinforced plastic reflector.

FACTS

Unified Remote Control

- Ergonomic design.
- Color-coded 30-button keypad for ease of operation.
- Operates satellite receiver and most brands of TVs.


THE DELUXE DSS SYSTEM

The Deluxe DSS System offers the ultimate in direct-broadcast satellite enjoyment, including a deluxe DSS satellite receiver, universal remote control and 18-inch dish antenna. The dish has a dual-output LNB for multiple-room hookups (with optional DSS receivers).

It offers these features not found on the basic system:

- Low-speed data port for non-video information.
- Color-coded 39-button keypad for ease of operation.
- Operates satellite receiver and most brands of TVs, VCRs, laserdisc players and cable boxes.

STAND-ALONE DSS RECEIVER

The optional, stand-alone DSS receiver lets you expand your system to additional rooms in your home when used with DS2430RW system, and includes the same features as the DS1120RW Satellite System Receiver. 

One of the more frequently posed questions from somebody just becoming immersed in the wonderful world of satellite television is: How did all of this get started? And another is: How long has this been going on???

There is some dispute about who had the very first home TVRO (television receive-only) system ... but not much. An Englishman, Steven J. Birkill, built a small, experimental system in 1975. Birkill's reception was from an American satellite (ATS-6) on loan to India. And while, strictly speaking, it did not receive microwave television broadcasts (because the ATS-6 transmissions were in the UHF frequency band), Birkill was certainly first to do what we now routinely take for granted.

In North America, there is still something of a tug of war going on between a fellow named H. Taylor Howard and this writer. I can't settle who did it first, here, but the time frame is 1976 or so and both Tay and I had operating 3.7-to-4.2GHz, or microwave, home terminals at about the same point in time.

Taylor's first terminal used an antenna he salvaged out of a military-surplus disposal yard. It had spent all of its previous life aboard a naval ship, tracking missiles.

My first antenna was constructed out of steel beams, bars and plate. This 20-foot monster weighed in at more than 3,000 pounds but, in spite of this weight, my seven-year-old son could use his own muscles to move it from satellite to satellite throughout the sky. (Yes, that was before any of us had figured out how to attach a motor drive to a dish!) Taylor tells of his first satellite reception: a static display card transmitted by HBO, which said, "ATTENTION All Earth stations."

I missed that one. My first reception, when we finally got the terminal operating, came from an early Canadian satellite and I wouldn't allow anyone on hand to touch or even *breathe* on my 20-foot dish until the 30-minute newscast uplinked from Vancouver, British Columbia, was over. I remember that first reception with unusual clarity.

Taylor and I didn't know each other at the time. I heard about him late in 1977 "through the grapevine" and established contact the old-fashioned way: I wrote him a letter.



Going To The Source—Bob Cooper (right) with Arthur Clarke (center, shown with satellite pioneer Dave Johnson).

Bob Cooper was one of the earliest pioneers and promoters of home satellite reception. He quickly achieved national status by telling how anyone could build his own receiver and by attacking the "scrambling" of programmed signals. He wrote this article for the November 1985 issue of Home Satellite TV Magazine.

The Fascinating Story Of The Satellite Revolution From An Eyewitness To Its Birth

How It

I was also doing some other writing at about the same time, an article for *TV Guide*, which would ultimately appear in print late in October of 1978. In that article, I told all about my 20-foot dish and casually mentioned that one of the “benefits” of owning a TVRO was that you could tune in Johnny Carson’s *Tonight Show* on satellite. Not a big deal, you say?

Well, it was in 1976 and ’77 because NBC used to transmit the live broadcast of “JC” in Burbank, California, back to New York, where it was videotaped for later play that evening. At around 5 p.m. Pacific Time, the *Tonight Show* was done “live” and it would be sent out over the network at 11:30 Eastern Time. Back in New York, they would tape it and add in the evening’s commercials. While New York was adding these commercials, the live satellite feed rolled ahead. During those one-, two- and three-minute commercial breaks, Carson and sidekick Ed McMahon or guests would often go from mildly R-rated to “triple X.” So the live segments during the commercial breaks were far better than the actual program. That handful of us who had TVRO terminals got the unexpurgated Johnny Carson. And I said so in my *TV Guide* article.

Two things happened after that article came out:

- (1) NBC *immediately* stopped using satellite to send the Carson show back to New York, and
- (2) I got 10,000-plus pieces of mail in 10 days’ time. My mailman groaned under the load.

Years later, an ABC newsman named Max Robinson would be caught doing the same thing Carson had done nine years earlier: saying things “off camera” (but “on satellite”), which home viewers were not supposed to hear. Max, sitting in ABC Chicago, would spend 30 minutes or more “warming up” before it was time for him to do a handful of inserts in the ABC *World News Tonight* program. In that 30 minutes of warm-up time, he would sip on what everyone assumed was a Bloody Mary, chew out staff members, make racial slurs and generally be very entertaining. In fact, a bar in South Carolina, equipped with a TVRO, started a regular “Max Robinson Hour” special, serving Bloody Marys to its clientele and putting Max up on the big screen for everyone to see.

Ah, yes. Those were the good old days. Some of



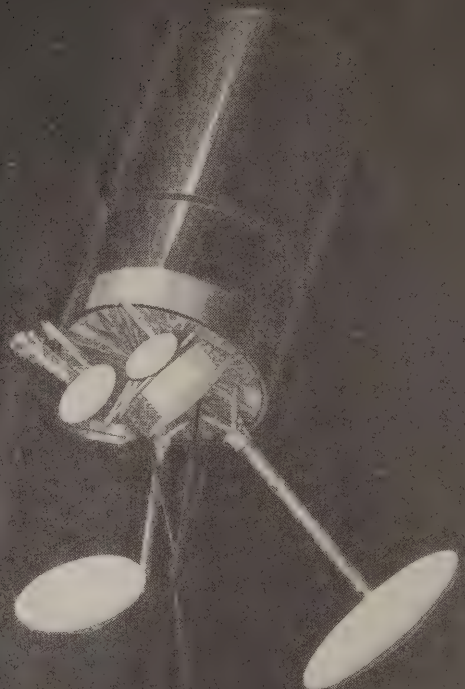
Huge Early Dishes—18-footer shown for use in far North.

the old-timers in TVRO have hours of “satellite outtakes” recorded on video during that era. And perhaps, someday, someone will round up much of this and release an “inside satellite TV” video for after-hours viewing.

I also remember the time pert Jane Pauley was being transported around a farm in Iowa by a farmer

continued on next page

All Began



Big Bird—First satellites were large (this one is nearly 39 feet high) but broadcasted at very low power.

How It All Began from page 55

who was obviously not impressed with her. She issued commands to the farmer, concerning when and where he should start and drive his tractor, “off the air” (but still on satellite). The farmer took all he could of this for an hour or so, and then informed Pauley about several of her ancestors she had probably forgotten.

But I digress.

Certainly not all of this is gone today. The networks have finally wised up to the fact that more than a million of us have dishes and that most of us have motor drives and “itchy trigger fingers” scanning the skies from sunup to sundown and in between, just looking for some “fool” to prove it. But the baseball, football and other sports feeds continue to have elaborate pregame and half-time equipment-setup periods and, while the crew is getting ready for the event, it is still commonplace to hear announcers give their frank (and usually candid) impressions of the teams they are about to cover.

Monday-Night Football with Howard Cossell, some years ago, was always far more fun to watch on the ABC satellite feed between the stadium and the network, than on the regular network-to-station channel. Cossell is known for being blunt in public. You should hear him in private!

Alas. I digress again.

Those 10,000 pieces of mail I got had a familiar, recurring theme. Virtually every one of those writ-

ers asked me to tell them where they could purchase a TVRO. (An insignificant handful suggested that my terminal was “the work of the devil” and that I would do well to destroy it before it destroyed me. In retrospect, this minority was right; look what it has done to me!) Those who wanted a TVRO usually said, “Price is no object.” Right on.

Price was *not* the object. *No amount of money could buy one!* At the very most, 200 new terminals per month were available, and cable companies were snapping up this full production lot—at \$30,000 and up each—and waiting in line six months, at that, for delivery.

Obviously, something had to happen.

I decided that what the world needed most was \$1,000 home TVROs. I talked with Taylor about it. At the time, he was a professor of electrical engineering at Stanford University. Taylor thought that, given a couple of years, a \$1,000 terminal was certainly possible, provided that the person acquiring the system did all the construction work on his own, as Taylor had done, and as I had also done some years earlier.

Out of those 10,000 letters came a very small handful of people (perhaps five) who, like Taylor and me, had already built their own terminals. I established old-fashioned contact with each and, between the seven or eight of us (who made up virtually the total home TVRO universe in 1978), we formulated a plan.

With me playing the part of “director,” each accepted a technical assignment. Taylor would design a low-cost receiver; a fellow in South Carolina, Robert Coleman, would design lower-cost LNAs; a man in Arizona, Oliver Swan, would design low-cost antennas; and a fellow in San Jose, H. Paul Shuch, would try to piece all of the parts together into a system.

We set a deadline, June 1, 1979, when everyone would be finished with his own part. Then I announced the first “Satellite Private-Terminal Seminar” (SPTS) and made sure that it got lots of publicity. We promised to show and tell people how to build their own TVROs for a cost of around \$1,000 each, if people would attend this three-day seminar.

I figured we might get 100 or maybe 200 people to show up; 505 came, from all over the world! We were standing-room only from the moment we opened.

Only, we almost didn’t open. Seventy-two hours before we were to open, a man in a uniform knocked at my door. He was smaller than my 20-foot dish in the yard next to the front door, but not by much.

“I have a subpoena instructing you to appear in federal district court at 2 p.m. *this* afternoon,” said the marshal.

In this subpoena, I found, I was being charged with a heinous crime: My SPTS was being labeled “a forum to teach people how to *steal* microwave



Dish Farms—Common 10 years ago, when C-band required a separate dish for each bird for simultaneous reception.

television programs”! The group bringing suit against me was a trade organization of microwave television program distributors.

It took four valuable hours in a federal courtroom but, even without an attorney to guide me, I beat the wrap. You see, back in mid-1979, it *was* illegal to tune in “private microwave transmissions.” That was before the FCC (Federal Communications Commission) changed its rules, and those rules said you could not tune in satellite [TV] broadcasts *unless* you had a license issued by the FCC. It turned out that I had such a license, because I knew the consequences of not having one! (It would also turn out that, in our seminar, the first thing we would do was teach those attending how they, too, could obtain such a license!)

As you might imagine, faced with the probability that Cooper/Howard “TV groupies” were going to inundate the FCC with applications for those special “experimental” licenses, the FCC did a quick back-step and, within 60 days, did away with the license requirement altogether.

In a strong sense, that action on October 18, 1979, was the “birth” of home TVRO, since, by eliminating the license requirement, people could simply buy a TVRO and install it, without worrying about breaking some obscure law *written in 1934!*

Then those 505 people attending that first SPTS went to work. Armed with three (now collector-class) manuals I had written using the research of Howard, Coleman and Swan, plus the system outlines provided by Shuch, these early pioneers went home and started building equipment. Most built their own systems just for the challenge (and perhaps a hidden desire to watch Max Robinson pour Bloody Marys on Caucasian assistants), but within months many of these people were actually building

equipment for resale. Many of today’s established firms started out as kitchen-table or garage-workshop construction projects.

And that is how, and when, it all started. Today, H. Taylor Howard is just finishing up a current year-stint as chairman of the board of SPACE, the industry’s trade association (which he and I, and a handful of others, started in 1980). Robert Coleman is selling and designing Space Vision LNAs, continuing in the work he began in 1978. H. Paul Shuch went back to teaching students at a college in San Jose, tiring of “the commercial rat race” of the TVRO business world about a year after it all started. Oliver Swan, the man who made truly low-cost antennas possible, died in December of 1979, just weeks after the FCC decided we were legal after all.

Me? I somehow manage to crank out around 150,000 words each month, filling up two separate editions of *Coop’s Digest*, the TVRO industry’s first trade publication. (Woe is me. There are now 28 publications in this field!) I spend five to eight days per month doing the physical work on the two publications. Otherwise, I’m doing what I enjoy most: sitting at 2 a.m. on the beach of the island of Providenciales in the Caribbean, where my 25-plus TVRO antennas feed hundreds of satellite signals into an amazing collection of equipment which puts me, at will, in tune with virtually the entire world.

You, meanwhile, are just getting started. You may never see Johnny Carson do an ad-lib commercial for “Dismiss” on your TVRO, but nine years from now you will cherish those first few months when you did have a TVRO “way back in the fall of ’85.”

(Editor’s note: As of this writing “Coop” has not been prominently involved in the satellite field for several years. His current whereabouts are unknown.) ♡

Send The Signal To A Home Theater

The Satellite's Superior Signal Warrants Upgrading Your System

by Carl Sanchez

"Home theater" is the latest buzzword to catch the attention of Americans looking for the ultimate audio/video experience. The idea, of course, is that you can build a cinema-like theater in your own home and enjoy marvelous sound and sight experiences.

Today, home theater components are being sold by almost all the major, and many of the minor, manufacturers of consumer electronics. You can have a huge, 60-inch television screen, a Dolby Surround Pro-Logic audio amplifier, THX speakers and so on.

In other words, you can produce the best possible video and audio at home—actually as good as that of any movie theater.

The weak link in this chain of A/V products has always been the quality of available programming. Yes, you can buy a laserdisc and replay movies in high resolution and with digital sound. But what about current sports events, the latest movies not yet out on laserdisc or even the various shows on networks and independent television stations? For these, you were forced to accept over-the-air or cable broadcast, which delivered a signal that was usually far inferior to that of your own home theater system.

Not any longer! With the advent of the Digital Satellite System (DSS), you can now have high-resolution video approaching high-definition TV

Get digital sound along with near HDTV (450 lines of resolution)-quality video at low cost and delivered directly to your home via DSS.



(HDTV) and digital sound. And you can have it at low cost and delivered directly to your home, without cable or a conventional over-the-air TV antenna.

Connecting To DSS

To get the high-quality audio/video from DSS, you must purchase a DSS system. There are two models. They both include a small, 18-inch dish, which you will mount, or have mounted, at a convenient location on or near your home and a receiver with remote that you'll incorporate into your home theater system. (By the way, the remote is the "smart" kind that can operate other equipment such as TVs.)

The receiver can be stacked with your amplifier, CD player, S-VHS VCR and so on. By the way, the RCA-brand DSS receiver is made by Thomson Consumer Electronics and, if you're looking to build a home theater system, you can stick with matching RCA equipment throughout, although that's not vital.

The DSS receiver's outputs include S-Video. Technically, this means that the luminance and chrominance signals are separated before they are sent to your TV monitor. Practically speaking, it means that you can receive a signal with 400 lines of resolution or more. (Thomson claims 450 lines of horizontal resolution from the DSS system.)

In addition, the system offers RCA-type audio outputs that can go directly to your Dolby Surround Pro-Logic amplifier. These are left and right, of course.

The result is that, as soon as you get a DSS receiver and incorporate it into your home theater setup, you can be watching high-resolution video along with CD-quality sound—for all of your favorite programming. (Note: Not all programming is broadcast in Dolby Surround sound, but a significant amount is.)

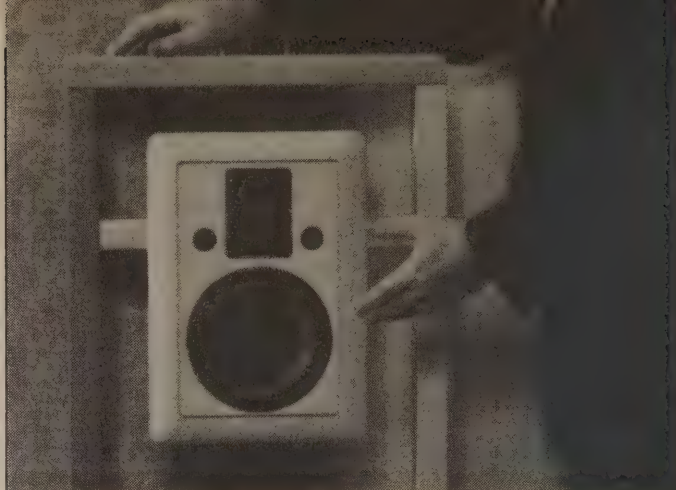
Further, the DSS receiver is expandable. For the future, the possibility exists that, when true HDTV is made available, you'll be among the first to receive it. The set includes a wide-band data port for this very purpose. (Other equipment may be necessary, depending on what system the U.S. eventually adopts.) And there is also the opportunity, in the future, to use the DSS receiver for interactive television, games and more.

The Components

If you're considering putting together a complete home theater system with DSS, here are the components you're likely to want:

DSS Receiver

As noted earlier, these are RCA receivers, currently only available from Thomson Consumer Electronics. There are two basic configurations. The basic system includes the standard receiver with most of



Increased Performance—To go with the new satellite system, RCA is introducing a new Video Acoustics front- and rear-sound system to create theater-like sound.

the features noted above, except for a low-speed data port.

The deluxe system includes a low-speed data port that can be used for non-video information. It also includes gold-plated A/V jacks for better signal transmission. Both receivers can get 150 video channels.

Dolby Surround Pro-Logic Amplifier

The "surround" effect is an attempt to duplicate the movie-theater experience in the home. It is designed primarily for improved audio pleasure while watching movies, although it can provide improved sound in almost all audio situations.

The basic surround system works by adding rear speakers to the traditional stereo front left and right speakers. ("Stereo" does not mean "two speakers," as many people mistakenly believe. It's short for "stereotypical," which means that the sound is realistic. In movie theaters Dolby Stereo can have five or more channels of sound.)

The rear speakers have separate wires leading to them but they are actually a single channel. Surround sound provides three channels: front left, front right and rear. The rear-channel sound is delayed by microseconds so that it is heard ever so slightly after the front channels. (Psychologically, the human mind associates a sound with the location where it is heard first.)

By feeding separate audio information into each channel, a presence, or an illusion of realistic sound, is created. When simply listening to an audio-only presentation, two front channels or two front and a rear channel can provide extremely pleasing results.

For movies, however, this basic surround system is often unsatisfactory because characters' voices are often misplaced, coming either from the left or right front speakers when they are actually appearing in the center of the screen. (In a basic surround system a "phantom" center channel, which blends sounds from both left and right and helps to carry voices somewhat, sometimes occurs.)

In response to the need for better placement of

voices, Dolby Laboratories created Pro-Logic. This adds a fourth channel of sound, in the center. The center channel helps define voices when you're watching a movie and helps to make the experience more enjoyable.

Movies received over the DSS system that were recorded in Dolby Stereo (the term for the cinema version of Dolby) are usually encoded with all the information needed in order for it to be played back on your Dolby Surround Pro-Logic amplifier, which decodes the signal and sends it to the appropriate speakers. Thus, you can listen to your DSS movies with cinema-style sound. (Note: Many other programs are likewise encoded and may also be listened to in "full sound.")

Home THX Systems

A more recent development is the THX Home Audio System, developed by Lucasfilm. This utilizes speakers, receivers and other equipment specifically approved by Lucasfilm and containing specific features which create sounds in the home that more precisely replicate those of a movie theater. Home THX relies on a Dolby Surround Pro-Logic system as its basis—and adds to it. While it is beyond the scope of this article to go into the details of the THX Home System, suffice to say that it works optimally when a movie was recorded in THX. (Note: Neither Dolby Labs nor Lucasfilm actually make sound equipment. They simply license manufacturers to produce equipment to Dolby Labs' or Lucasfilm's specifications.)

The bottom line is that the quality of the sound you'll get from your home theater system will be as good as the equipment you have plus the signal you receive. Adding DSS should improve the sound from any home theater audio system.

The TV

The quality of television you receive from a DSS system will depend almost entirely on the quality of your television set. It's important to understand, however, that, here, quality does not equate directly with size—that is, a larger-screen TV does not necessarily mean higher resolution.

For example, for several years now many manufacturers have been producing entry-level tube TV sets of up to 30 inches for prices below \$300. While the screen is big on these TVs—and they usually have a variety of features, such as on-screen menus for controlling the contrast, tint, brightness and so on—the resolution is usually quite low, perhaps 230 lines or so. (Television quality is measured in horizontal lines of resolution.) Further, these TVs usually only accept a single composite coaxial cable, which carries both the audio and video signal.

A step up are the higher-priced, so-called "monitors" sold by retailers. In truth, any television used for video only (the sound coming through a separate system) is technically a monitor. These sets usually accept both the coaxial cable and separate RCA

connectors for video, as well as left and right audio. Often, they offer higher resolutions, sometimes 400 lines or more.

However, it's important to understand their limitations. The right and left RCA jacks for stereo sound are useless, *if* you are using the TV as part of a home theater system in which you have a Dolby Surround Pro-Logic amplifier and speakers. You won't want the television set's sound, so you won't be using its audio jacks; you'll turn down the TV sound. (A "poor boy" home theater sometimes will use the TV sound for a center channel; it's not great, but it will work when financial limitations prevent purchasing a full-blown system.)

In addition, the single RCA-type video jack is still a composite signal. It combines luminance (roughly speaking, the black-and-white portion of the picture) with chrominance (the color portion). Thus, even though the TV may have a higher resolution capability, chances are the signal won't be good enough to provide it.

Some high-quality TVs, however, offer S-Video ("Super Video") input. Here, the chrominance and luminance are sent by separate wires and then combined in the TV set for the highest possible resolution. DSS offers S-Video output.

Thus, to receive the highest-resolution video reception—as noted, Thomson claims 450 lines—your TV set should have an S-Video input. This is offered on many of the better-quality, large, tube types, as well as big-screen rear-projection TVs.

When looking to buy a high-resolution TV, a good tip is to ask for S-Video and high "lines of resolution" but forget about looking for stereo. Stereo in a TV, when the set is being used as a monitor in a home theater, is simply wasted; you don't rely on the TV for sound.


Other Components

You may want a VCR that offers S-Video capabilities. Other parts of a home theater system normally include an S-VHS VCR (to play back high-quality videotapes), a laserdisc player and a CD player, as well as an A/V switcher (often built into the amplifier) to help control the system.

Adding DSS

Up until now, the main elements of a home theater system were the VCR and laserdisc player. They were really the only components capable of providing the high-quality video and audio the system was capable of reproducing.

With DSS, that's all changed. Now you can get high-quality audio and video from satellite transmissions—the latest movies and sporting events, concerts, special presentations and much, much more.

If you have, or are considering putting together, a home theater system, there's a new component you won't want to be without: DSS, the new centerpiece of any home theater setup. 

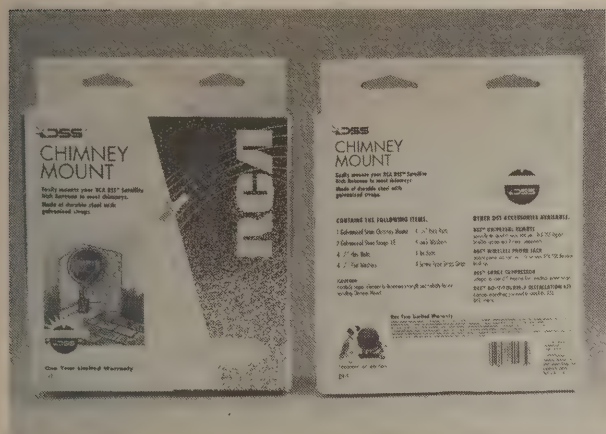


Accessorizing Your Dish—It will help to increase your viewing and listening pleasure. Adding wireless phone jacks (left) turns any electrical outlet into a phone jack for receiver hookup.

Add-Ons For Home Satellite Systems

Accessorize Your

Special chimney-mount kit, sold separately.



RCA's line of universal remotes.



New accessories designed for the DSS satellite system.



When you're buying a new car, you have choices. You can purchase a "stripped" model, which only offers factory basics. Or you can buy a "loaded" version, which comes with all sorts of options to dazzle and thrill any owner. The same applies to DSS. You can buy the basic system manufactured by Thomson Consumer Electronics (under the RCA brand), which includes a dish, remote and receiver. Or you can upgrade by adding accessories that will increase your enjoyment of the system many times over.

Remote-Control Sender

Here's a power accessory that can give a boost to your pleasure, particularly if you want to have your television set in one room and your DSS receiver in another. It's called the DSS Remote-Control Signal Sender (Model D940) and it's a state-of-the-art device which operates much like a remote garage-door opener.

To set up the Remote Control Signal Sender, the base unit is placed in front of the DSS receiver and plugged into any AC outlet. The extension unit is placed near the television set(s) and also plugged into an AC outlet.

Once in position, the extension unit receives the infrared signal transmitted by the remote control included with the basic package. That signal is then converted to radio frequency and sent, via invisible radio waves (no wires), to the base unit in the other room. The base unit receives this radio-frequency signal, converts it back to infrared and sends the infrared signal to the DSS receiver. Thus, you can be in the bedroom and use your remote to change channels on the DSS receiver in your living room. The signal is sent from your remote to the converter, changed into radio waves, sent to the converter in your family room, changed back to infrared waves and sent on to the receiver.

The maximum range of this system is 140 feet and it's compatible with most remote controlled VCRs, laserdisc players and audio components. Its price is \$59.95, with additional extensions (Model D935) available for just \$29.95.

According to Len Coakley, accessories business manager for Thomson, "The Remote Control Signal Sender represents another breakthrough in DSS developments." It certainly seems to be piling high tech on top of high tech.

Remote Phone Jack

Similar to the remote sender discussed above, the Wireless Phone-Jack System (Model D916) uses two units, a base and an extension, to connect a phone receiver to its corresponding telephone line without running additional wiring. The base plugs into an electrical outlet located near an existing telephone jack. The extension unit operates as a phone jack by transmitting an FM signal, using AC

continued on next page

Dish

Remote-Control
Signal Senders—RCA
D940-RCU940



Accessorize from page 63

electrical wiring. It plugs into an electrical outlet near the DSS receiver. Thus, you are able to call to order services (such as pay-per-view) and, in the future, to access the many user interfaces (including game playing) already built into the DSS system.

Signal Booster

If you're still using an external antenna for your TV, or can remember back before cable when you did, you'll immediately recognize the value of this little item. It's a 13dB in-line booster amplifier that improves the signal strength coming to your TV set. It's particularly useful if the antenna is more than 100 feet from the DSS receiver. The suggested retail price is \$19.95.

Surge Protection

Also available from Thomson is an AC surge protector (model D917), with a suggested retail price of \$19.95. Even though the various power companies throughout the U.S. will tell you that they deliver a constant voltage, the truth is that, during the day, almost everywhere in the U.S., the

voltage can rise and fall as much as 20 volts. (The frequency of 60 cycles per second, of course, is always constant.)

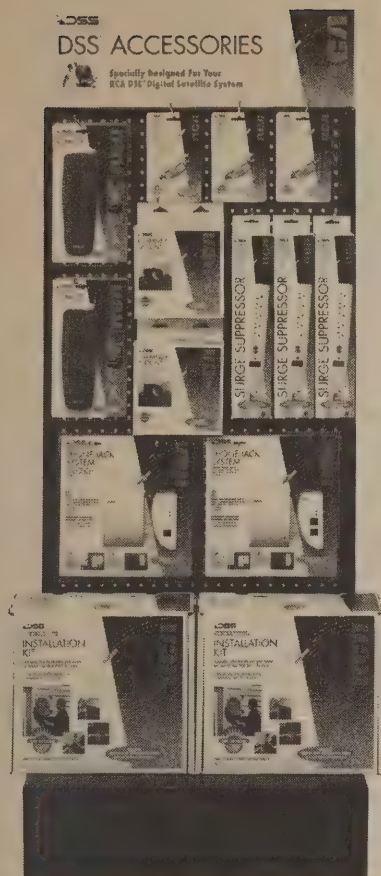
A difference of a few volts isn't going to hurt the DSS receiver or most other electronic gear. But big power surges of thousands of volts, though only lasting a fraction of a second, can do severe damage. These can be caused by lighting strikes or problems with the power company's electrical delivery system. Your best protection is a surge protector.

While the RCA model offers basic protection, other models by a variety of different companies are also readily available. Generally, with a surge protector you get what you pay for, however, if you get a model costing \$50, you can be pretty sure it will give you more than twice the protection of one costing half as much.

Chimney Mount

The standard installation kit comes complete with hardware that can be readily adapted to a wide variety of installation locations including walls, roofs and even deck railings. (The optional installation package is almost a must if you're going to put your dish anywhere but on a flat surface.)

However, if your best installation location is on a



DSS accessories are now delivered in easy-to-find packages for display wherever the system is sold.



chimney, the standard mounting brackets simply won't do. What you need is the DSS Chimney Mount System (model D915, \$24.95). This includes brackets and hardware specifically designed to fit the 18-inch satellite antenna (dish) directly onto a chimney.

If you're wondering about a chimney mount, keep in mind that it has both plusses and minuses. The big advantage is that strapping the dish on your chimney may give you a clear line-of-sight to the two DBS satellites hanging over the equator. Indeed, this may be the only way to get that open angle.

On the downside is the added strain put on your chimney. While most chimneys will withstand the weight and drag of a mounted dish, there's always the chance that an older chimney, one that wasn't particularly well built or one that may be subjected to high winds or possible earthquake damage could crack or even collapse. It's probably a good idea to take a close look at your chimney before deciding to hang your dish on it.

System Options

The step-up DSS model (\$899) is currently out-selling the lower-priced basic system in most areas. The \$899 unit allows you to have the option of running two televisions with independent tuning of the 150-plus channels on the DSS. This is supported by a second lead (or cable) from the front of the DSS dish, which feeds the full signal of the satellite to two sources. This requires the purchase of a second receiver (currently selling for about \$649).

The \$899 model also features an upgraded remote that will also control your VCR, remote-controlled CD player and other infrared devices. This upgraded receiver also has a built-in Wide-Band Data port for later data upgrades, and for future programs broadcast in the HDTV format.

When you purchase the upgrade system, you are not required to purchase the second receiver or any other hardware immediately. But as a practical consideration, if you feel you want the flexibility of tuning in different programs in various parts of your home, the upgrade unit has its advantages. Another benefit of purchasing the upgrade is that your program package will only be billed to you once for both TVs.

Note: If you want to save money and purchase the \$699 DSS, you can still hook up your second TV, using a conventional video "splitter." Keep in mind, though, that both TVs can only show the one channel selected on your DSS receiver. And should you wish to upgrade at a later time to the two-receiver system, you will not need to move or reinstall your dish; however, you will need to run a second cable and upgrade your receiver box.

Choices galore and a variety of prices. The new DSS system options will dazzle and tempt you but, remember, the basic system is all you need to "basically" get started. 🍀

The Home Satellite Story

A Newcomer's Guide To C-Band

TV signals from space, direct to the TV set in our home - when we first hear it, sounds like an idea from Buck Rogers.

But, in fact, it's the story of the future happening in the present.

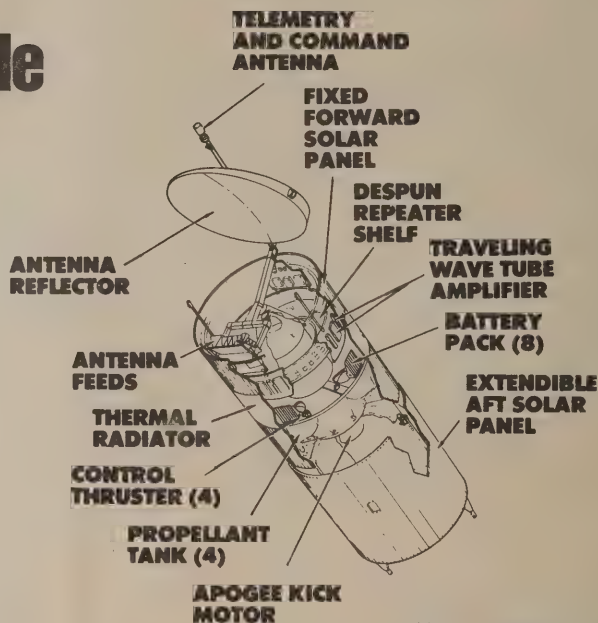
And it's not that hard to understand. We're all familiar with how conventional TV works. There's a local station which broadcasts a signal. The signal travels directly to an antenna placed on our roof, carried down by a wire to our TV set where we view it.

The limitation is that the signal rarely travels more than 50 miles, restricting the number of stations we can watch. Cable usually is an improvement. A cable operator receives both direct signals such as described as well as signals of many distant stations sent either by microwave or satellite. These then are sent to our home via cable connections.

Satellite TV works best of all. With Satellite TV, we bypass the cable operator. We set up a dish antenna in our yard which receives TV signals directly from satellites out in space. (Remarkable as it may seem, these satellites are stationary relative to the earth, so it's fairly simple to aim a dish at them and keep them in "focus.")

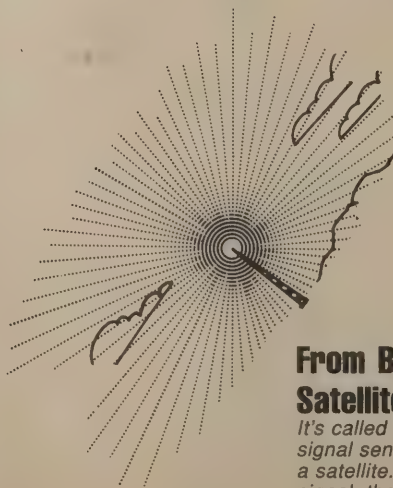
Powerful TV stations send the signals to the satellite (called "uplinking"). The satellites receive them, then rebroadcast the signals back down to the earth. Because of their height, the signals, though weak, can cover an entire continent (the area of the earth the signal hits is called its "foot-print").

Once we've set up an antenna and are receiving a signal, it's piped to our house through wiring and then to a special receiver which allows us to view it on our TV set.



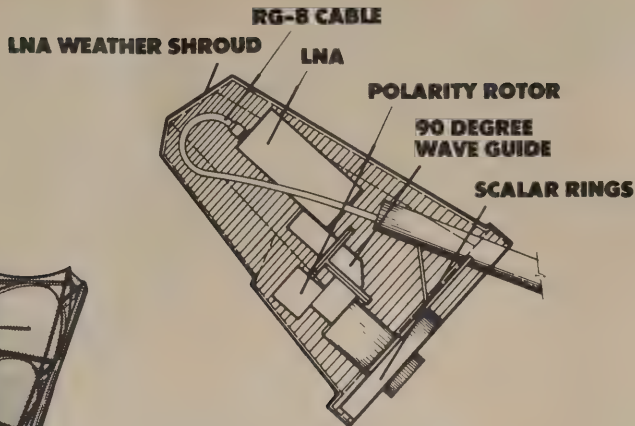
The "Birds" In Space

Arthur C. Clarke first surmised that a satellite could be launched into an equatorial orbit where the pull of gravity would just be offset by the speed of the vehicle. From earth, the satellite would appear to "hang suspended" without moving, 22,300 miles high. From such an altitude a TV signal broadcast down could cover enormous areas such as the entire United States.



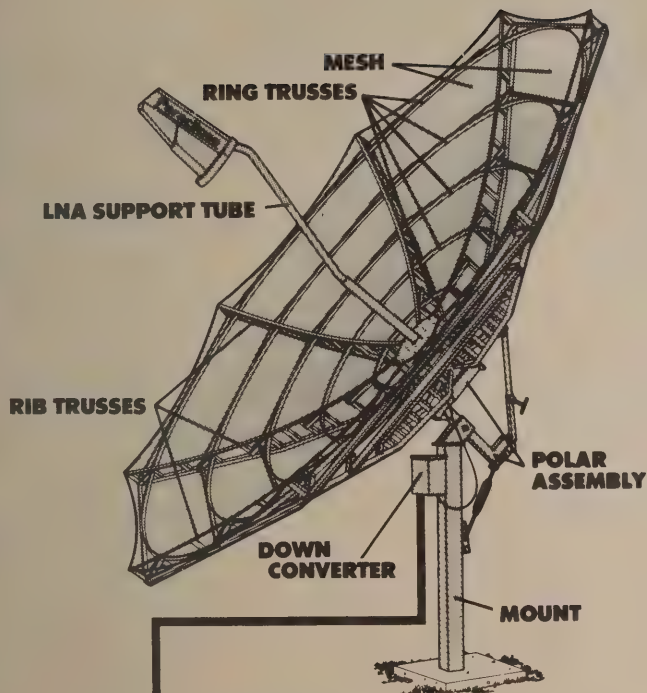
From Broadcaster To Satellite

It's called "uplinking" and refers to the signal sent from a powerful TV station to a satellite. The "bird" receives the signal, then rebroadcasts it to you.



Tuned Feedhorn Assembly

The LNA (Low-Noise Amplifier), suspended at the center of your C-band dish enormously amplifies the minute signal. Its power is measured by how little "noise" it adds. The lower the noise of the LNA, the better.



C-Band Dish

A parabolic reflector that you set up in your backyard. It's not the actual antenna, it just captures the signal and focuses at its center. The antenna is a tiny device at the center with an amplifier.

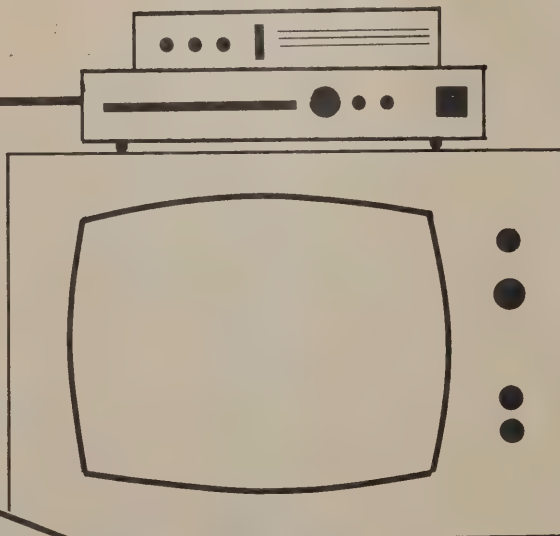
Illustrations courtesy of Paracclipse Corp.

Antenna Positioner

Activates a motor drive on your dish. A quick change of satellite is managed from within.

Satellite Receiver

You need a special receiver to "translate" the satellite signal before you can see it. The receiver connects to your TV.



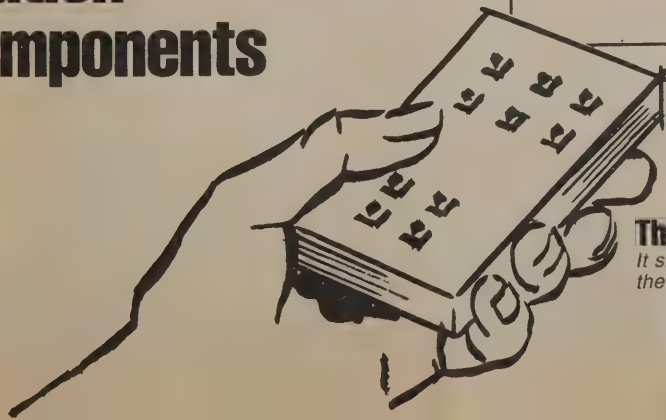
Private Earth-Station Components

The Picture

At the end of a satellite system, you can use any TV designed to be played in the United States, no special set required.

The Remote

It should control both the receiver and the TV.





*Mammoth dish
used for uplinking
to satellites.*

The C-Band Alternative

The Big Dishes Still Give You More

Satellite TV has been around now for more than a decade. With promises of new, smaller antennas and more channels, the new DBS (Direct-Broadcast Satellite) systems have created quite a stir. But perhaps, to get a better idea of what they have to offer, we should compare them to the more conventional satellite systems to see how they are different, how they are the same and, ultimately, which one is the better buy.

DBS And DTH—What Does It All Mean?

To begin with, DBS and DTH are both acronyms. DBS means Direct-Broadcast Satellite while DTH means Direct-To-Home. DBS systems use a newer breed of satellites, which operate at higher power levels and on higher frequencies than their predecessors, allowing them to get digital-quality reception with smaller antennas (18 inches in diameter).

In technical terms, the DBS satellites, or “birds,” operate in the Ku band. The term “Direct Broadcast” was coined because these satellites were sent into space specifically for the purpose of sending TV signals directly to the end user, the home owner, bypassing local cable systems.

The more traditional satellite systems, which have been serving cable and backyard-dish owners for more than 15 years operate, on C-band. The term

“direct-to-home” was created as a marketing strategy to distinguish C-band systems from Ku-band DBS, while still emphasizing that you do, indeed, receive the programming direct from the satellite, bypassing cable middlemen.

What About The Big Dish?

In the early days, the first satellites transmitted with only 5 watts of power, the same power level as a CB radio! Cable companies would install dishes that were 20 feet in diameter, or even larger. Consumers needed dishes at least 10 feet across to get good reception, and 12-foot dishes were popular for those who wanted superior reception.

Today, a new generation of C-band satellites broadcast with power levels of around 15 watts, three times that of earlier birds. C-band based home systems now utilize antennas only six or seven feet wide—a significant decrease in size. Compared to a 10-foot dish, overall surface area is reduced on a seven-foot antenna by over 50 percent, and on a six-foot model by nearly two-thirds! Compared to the first dishes installed for home use, they appear tiny indeed.

For the home owner with some yard space, the new, smaller, C-band antennas are much more ap-

continued on next page

\\Where will the DSS system get most of its programming? From C-band (satellite system), of course! Check out the initial lineup of services and you'll find that they're basically just a new delivery system for the same old programs.//

peeling. However, they still leave the renter (of home or apartment) totally out of the picture. Although the dish and other electronics can be moved, a person who rents a home cannot usually obtain financing for the purchase and installation of all the hardware, let alone permission from the property owner to install it.

Who Has The Most Channels?

Well, there is a lot of talk about the coming 500-channel world of satellite reception, but I think most people are savvy enough to know marketing hype when they hear it. Someday there may very well be 500 channels but that day is still a ways off.

Current DTH Programming

Until now, the DTH C-band satellites have been supplying virtually all programming to every cable system in existence. In years past, a lot of this programming won a foothold of consumer acceptance because of cable. This popular programming includes children's channels; music channels; all the premium channels such as HBO, Showtime, and The Movie Channel; dozens of sports channels; Pay-Per-View ... In short, pretty much anything you've ever seen on cable (except for local programming) came from a C-band satellite.

But that's only part of the picture. No cable system can afford to pick up all the channels that are available. On C-band there are, all together, well over 100 channels that can be received. Most cable companies give you only a small portion of what is actually up there in the sky. Only the home dish owner has access to it all.

The key words here are "can be" ... for a price. Just as with cable, to receive premium channels on satellite you must pay. The difference is that on most cable systems, for about \$30 a month, you get one premium channel (such as HBO) plus a handful of basic programming which includes the networks and all of the local channels that you could pick up for free with an outside antenna.

With a DTH system installed, for about the same \$30 a month, you can have up to eight different premium channels and more basics than cable can provide, including the big three networks (from cities like New York or Denver).

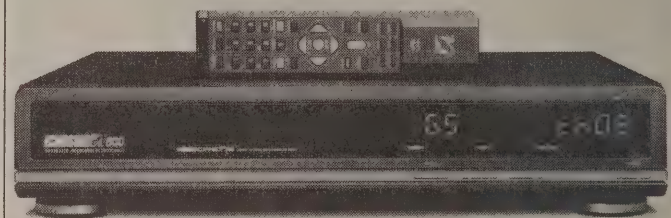
Of course, you have to buy and maintain your own satellite system but, generally speaking, once it's paid off, a DTH system produces more bang for the buck than cable. But how does this compare to DBS?

DBS Programming

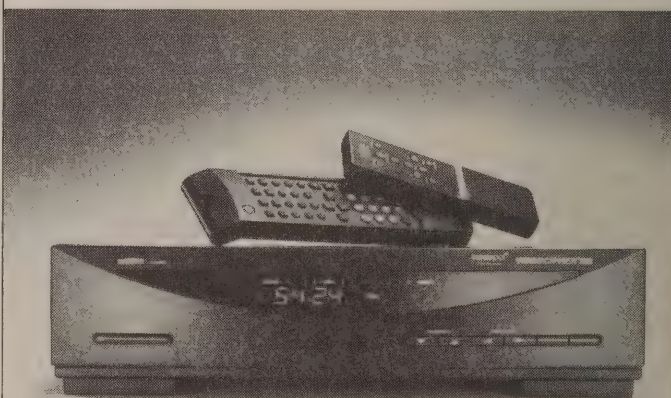
To begin, where will DBS get most of its channels? From C-band, of course! ... Well, indirectly, anyway. Check out the initial lineup of the various DBS services, and you'll find that they are basically just new delivery systems for the same channels.



Zenith integrated C-band satellite receiver decoder ZS8000LE.



EchoStar 600 satellite receiver positioner.



Uniden's SQ 590 satellite receiver descrambler.

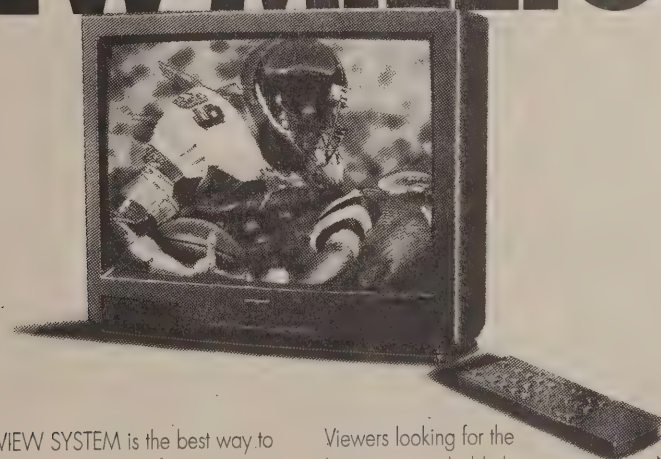
Of the two new DBS programmers, USSB has the exclusive on channels related to Time Warner (HBO and Cinemax, plus others) and Viacom (Showtime, The Movie Channel, MTV, VH-1, Nickelodeon and more), with the rest of the basics spread between DIRECTV and USSB. Every month or so, each DBS service announces that it has signed a contract to add a new service and, in almost every case, these are channels that are already available on C-band!

The bottom line with both systems is not so much how many channels are available, but how much money you want to spend. Both DBS and DTH will offer dozens of channels, with a simple formula: The more you pay, the more you receive.

... With one exception. DBS systems are aimed at

continued on page 72

IF YOU WANT SOMEBODY EXPERIENCED IN SATELLITE TV SYSTEMS, TALK TO THE GUYS WHO'VE INSTALLED A FEW MILLION.



They know that the FULL-VIEW SYSTEM is the best way to get the most available in TV viewing. That's because the FULL-VIEW SYSTEM can beam over 350 channels directly to you — each and every day.

After millions of installations, the FULL-VIEW SYSTEM guys have seen every kind of satisfied customer. Those who wanted the most sports possible.

Viewers looking for the hit movies and old classics.

You name the kind of programming, and these guys have seen millions who've been thrilled with their choices.

THE FULL-VIEW SYSTEM

The one that dishes up everything.

largest selection of News junkies. Music fans. So talk to the guys who've got the FULL-VIEW SYSTEM, and they'll let you in on a whole world of choices.

a fixed position in space, with reception from only one or maybe two satellites. C-band reception has access to over 16 different satellites. Because C-band is a delivery system used by many different independent programmers, the sky is like a huge smorgasbord, with all kinds of free channels available. There are over a dozen home-shopping networks, another dozen or so religious channels, music channels, some sports, channels similar to superstations, and more. Their audience consists of home dish owners, low-power TV stations and any cable system that decides to add them to its lineup—which means that a lot of the channels that cable companies charge you for don't cost them a dime, or at least very, very little!

For the unjaded who are simply looking for additional channels to go along with the local networks received on a VHF/UHF antenna, all kinds of free channels are there to be had. Often, new cable networks like the Sci-Fi Channel or Country Music Television (CMT) were free for a couple of years before encrypting their signals and charging for their programming.

DBS is a different ball game—no free channels. Everything will be digitally encrypted and part of a subscription package. Over time, the basic service may grow to include many channels. But to start, the basic package will more or less resemble basic packages on both C-band and cable. Ku's promise is that it will create a huge library of specialized channels that will be available "à la carte," meaning that you'll be able to pick and choose what you want. These will appeal to niche audiences: viewers who are willing to pay the extra dollars to gain access to entertainment or information of a certain nature.

Pay-Per-View

Another reality of the 500-channel satellite world of the future are dozens, perhaps *hundreds*, of Pay-Per-View channels. Pay-Per-View is the viewing window for movies as well as sports, concerts and other special events. In the case of movies, availability is generally after they leave the theaters but before they become available to video-rental stores and also before they are aired on movie channels like HBO or Showtime. Currently on C-band there about half a dozen Pay-Per-View channels. Most repeat two or three different movies per day for a period of a week to a month, every so often dropping a title and adding a new one. Movies are generally geared to start in prime time hours like 7 p.m. and 9 p.m., to catch the greatest number of potential viewers (and subscribers).

By the way, it's called Pay-Per-View because you pick and choose, paying about \$4 to \$6 for one particular movie or special event (concert, etc.) at a time. The advantages of Pay-Per-View over renting a video are that you don't have to go anywhere;

either to pick out a movie or to return it, and you never pay a late fee. The disadvantage is you must conform to the channel's time schedule, not yours. However, DBS plans to have each movie on eight different channels at once, staggered at 30-minute intervals. No matter when you want to watch a movie, it's just about to start. There's just enough time to get the popcorn popped. Eight-channels-per-movie times 10 movies equals 80 channels—times 20 movies equals 160 channels.

For Pay-Per-View movies to truly succeed, prices will have to come down to become more competitive with those of video-rental stores. Right now, there is less than a landslide of subscribers rushing to order movies every night. Actually, the biggest sellers are special events like the Judds' farewell concert and wrestling matches, not movies at all. Expect lots more special-event Pay-Per-View programming on DBS.

A Matter Of Money

The DTH system does require more hardware than DBS does. The dish is larger and there's a motor; the electronics must include a power supply for the motor plus computer circuitry for storing satellite positions. An installed system is likely to cost you better than \$2,000, compared to around \$1,000 or less for an installed DBS system.

In C-band's favor are its free channels, plus the ability to deliver all the channels most in demand at a reasonable subscription rate. DBS offers a lower initial cost, with the potential for lots more programming in the future as more channels become available.

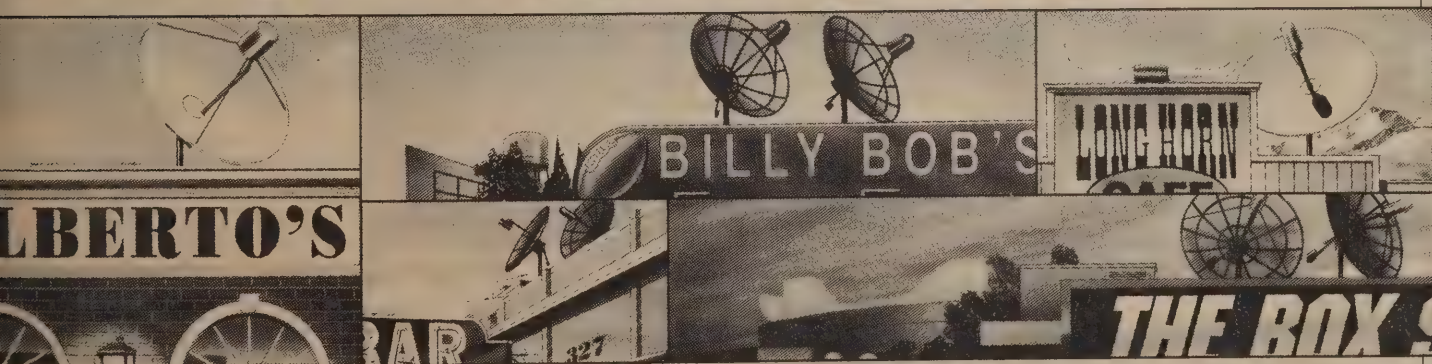
You Can Have It All

It's seldom mentioned but worth noting that C-band antennas can also be used to receive Ku-band and DBS signals. However, the electronics—that is, the receivers and amplifiers—are totally different. In the near future, expect receiver manufacturers to come out with combination receivers that will work for both analog- and digital-encryption systems. Eventually, it is likely that both C-band and Ku-band DBS signals will be all-digital and both will be received on the same dish.

In fact, the larger antennas may have a certain advantage. Ku-band signals are very delicate and can be adversely affected by rain or even heavy cloud cover. The DBS industry claims that the new 150-watt satellites are able to overcome any signal loss, yet it remains to be seen if snowy pictures on rainy days will remain a problem.

DBS or DTH? All I can say is that I have been a happy owner of a C-band system for many years and it satisfies all my needs. DBS is a good and exciting alternative—the perfect answer when a standard satellite system is simply not an option. In the end, your choice will be determined by a combination of price, space, convenience and the system that best fills your needs. ☛

IF YOU'RE CONFUSED ABOUT WHICH SATELLITE TV SYSTEM MAKES THE MOST SENSE, A VISIT TO ANY SPORTS BAR IN AMERICA SHOULD CLEAR UP THE PICTURE.



A sports bar can't afford to have a TV system with anything less than everything.
That's why they have the FULL-VIEW SYSTEM.

Now you can get the FULL-VIEW SYSTEM
beamed directly into your own home, bringing you
all the same great sports programming. And
you don't have to be a sports bar to afford it.
You'll get channels like ESPN, TNT,

MSG Network, Empire Sports Network, Prime Ticket Network, SportSouth, Prime
Sports Network, Sunshine Network and all 8
regional SportsChannels. Plus, you'll get all the
sports on SuperStations like WGN, WPIX and
WOR. And there's a lot more.

Get the FULL-VIEW SYSTEM today. It's your
All-Star season's tickets to everything.

**ASK ABOUT
THE FULL-VIEW SYSTEM**

The one that dishes up everything.

Lightning

Minimizing The Risks

A home satellite TV system, when properly installed, is designed to give you many years of service. A few basic maintenance and tune-up procedures will add years of life to your system, and can improve the system's performance.

LIGHTNING: MINIMIZING THE RISKS

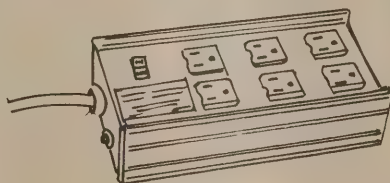
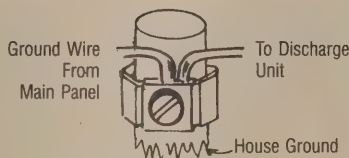
There is a sudden stillness in the air as billowing clouds darken the sultry afternoon sky. Distant thunder rolls a little closer each moment. All of the neighborhood dogs and cats have instinctively disappeared and the few people out in the open have just one thought . . . find cover!

Lightning! Even the word sounds electrified, and rightly so. The average lightning discharge can be up to 100 million volts and has an energy of 280 kilowatt hours—enough to keep an ordinary room air conditioner running for nearly two weeks.

We have all seen the effects of electrical storms: from the giant flash bulb effect that turns night into day, to the charred remains of a once majestic tree after taking a direct hit. By taking several precautions with your satellite system, one effect that you probably won't see is a blank picture on your TV set.

WHAT IS LIGHTNING?

Lightning is a large (up to 20 miles long) spark caused when a negatively charged cloud mass comes near a positively charged cloud or the earth. When lightning occurs between clouds, it is of no danger to your system, but when it strikes the earth, an unprotected satellite dish is an open invitation for disaster. A lightning strike directly on or near the dish can cause considerable damage to all components in the system including the TV set.



LIGHTNING DAMAGE TO SATELLITE SYSTEMS

The high voltage surges of lightning can enter your system in several ways; through the outdoor components located at the dish, through the cable between the dish and the house, and through the power wires coming into your home. Here are some ideas on how to minimize the chances of this occurring and if it does, how to minimize the damage.

If you are planning to install a new system, consider locating the dish on the ground near other structures. The tallest of these structures should be equipped with a lightning rod to attract the lightning and ground it safely away from the dish.

GROUNDING THE DISH

Whether it is mounted on a roof top or planted directly in the ground, a satellite dish must be properly grounded to a copper jacketed rod driven eight feet into the ground near the dish. You may be thinking, "Isn't the dish grounded through the steel pole anyway?" The answer is no. The

steel mount pole is usually buried only about four feet deep, and is encased in concrete which acts as an insulator. To assure a proper ground, the copper jacketed rod acts as the best conductor to the perpetually damp earth eight feet below the surface.

The reason for installing a copper ground near the dish is to provide the lightning with the quickest path to ground. If this high voltage is allowed to build up at the dish it can damage the LNA and may find an easier path to ground through the coaxial cable. This is why the National Electrical Code specified using both a ground rod at the dish and a discharge unit on the coax cable where it enters the home.

To further protect the system, the cable running between the dish and the home can be enclosed in metal conduit. All of the items necessary to ground the dish are available at local electrical supply or hardware stores.

YOUR HOUSE GROUND

The electrical system in your home should be grounded according to local, state and federal electrical codes. Never attempt any work on your home's electrical system without the assistance of a licensed electrical contractor. He can tell you if your system is properly grounded and can make any necessary changes.

Lightning can strike the overhead power wires coming into your home. Most of the energy will be dissipated to ground before entering the system. However, a momentary surge in power is common. For this reason, it is a good idea to unplug your satellite receiver and other sensitive components during electrical storms.

SURGE PROTECTORS

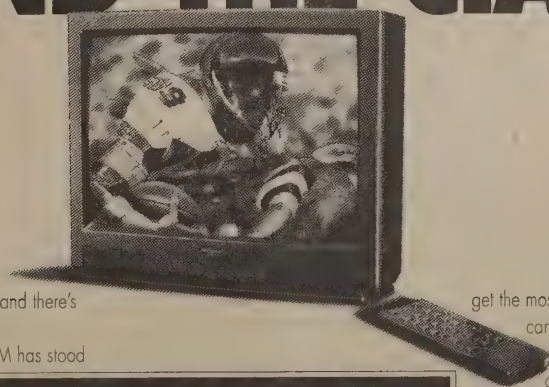
Surge protectors are devices that are placed in the line between the electrical outlet and components such as the satellite receiver, dish actuator control, VCR, and TV set. A surge protector acts as a buffer between the fluctuating house current and these components. They are a must for microprocessing based systems with memory circuits which are particularly susceptible to any surge in electrical current.

Surge protectors are available in various grades. Consult your satellite dealer as to the proper unit for your system. A surge protector with six outlets can be connected to all of the components in your home entertainment system.

GETTING A GOOD NIGHT'S SLEEP

There is no sure method for completely protecting a satellite system from the effects of lightning. You can minimize the risk of damage to the system, though, through proper grounding. If your current system is not properly protected, consult your dealer or an electrician about correcting this. If you are purchasing a new system, make sure the installation is grounded. Even if lightning never strikes, protecting your system can help give you a good night's sleep. ☘

**CONFUSED ABOUT
SATELLITE TV?
JUST ASK FOUR MILLION
SATISFIED CUSTOMERS,
INCLUDING EVERY
MAJOR NETWORK,
EVERY CABLE SYSTEM
IN AMERICA,
MAJOR LEAGUE
BASEBALL, THE NFL,
THE NBA, THE NHL
AND THE CIA.**



They've all got the FULL-VIEW SYSTEM installed – and there's no reason why you shouldn't too.

The quality and reliability of the FULL-VIEW SYSTEM has stood the test of time. Over the years we've installed over 4 million systems. So we know what we're doing.

And we know what we're talking about when we tell you that the FULL-VIEW SYSTEM is the best way to

**ASK ABOUT
THE FULL-VIEW SYSTEM**

get the most available in TV viewing. Over 350 channels can be beamed directly to your house each and every day. You can choose from every kind of sporting event imaginable to first-run and classic movies. And there's lots more.

The FULL-VIEW SYSTEM is your only choice, if you want a whole world of choices.

The one that dishes up everything.



PRIMESTAR Strikes First

An Alternative Smaller-Dish Direct-Broadcast Satellite System

Its name is PRIMESTAR, and it is the result of a common effort behind several of the country's largest cable operators to bring basic and premium television service to areas not currently served by cable. Because it is so tied in to cable, PRIMESTAR is able to offer its 70,000 customers in the lower 48 states a full lineup of basic and premium services, plus pay-per-view channels as well. PRIMESTAR has many things in its favor, and offers serious competition to DIRECTV, USSB (United States Satellite Broadcasting) and the current home dish market.

Although Thompson Consumer Electronics (RCA), DIRECTV and USSB—the new kids on the block with the Digital Satellite System (DSS)—have been getting lots of attention, the fact of the matter is that there has been another “DBS” (Direct-Broadcast Satellite) service quietly growing behind the scenes.

Is PRIMESTAR DBS?

In the race for technology, the true DBS people, like DIRECTV and USSB, do not consider PRIMESTAR part of their club, although PRIMESTAR is transmitted on Ku-band satellites and allows customers to use smaller dishes. That's because the signal is not as powerful as that of the newer breed of DBS satellites. By the FCC's definition, DBS satellites must have a transmitting power level of over 100 watts. The older-generation satellite, Satcom K1, which carries all the PRIMESTAR signals on 14 transponders (transmitters) has a transmitting power of 45 watts, versus the newer, Ku birds with 150 watts. This means that, while DIRECTV antennas are 18 inches across, PRIMESTAR's are 36 to 40 inches in diameter—still quite small. At around three feet in diameter, the dish is small enough to fit unobtrusively on the side of a house, on a roof or somewhere in the backyard. *continued on next page*

PRIMESTAR will supply, at absolutely no cost to new subscribers, all hardware needed for reception. You pay only a small installation fee, along with your monthly subscription rate.

In the meantime, PRIMESTAR already has plans to upgrade to a more powerful satellite, perhaps two, sometime after 1996 when the old Satcom K1 is retired. If new satellites are launched, they would have an output of 107 watts and 32 transponders, for a total of 150 channels, giving PRIMESTAR the option of using an even smaller dish and providing still more programming.

The question remains whether PRIMESTAR will opt to launch new satellites or share a satellite with a competitor, limiting its output to 70 channels but making its Ku frequency compatible with those of the other DBS services. The other option would be to remain in its current allocation: frequencies the FCC has allocated for Ku satellites transmitting on FSS, the "fixed-satellite spectrum."

If PRIMESTAR decides to go for true DBS, then the possibility for expansion may rest on a cooperative joint venture between PRIMESTAR and Echo-sphere, owners of the other transponders on the upcoming satellite.

The Receiver—Going Digital

Naturally, PRIMESTAR, like all the other systems, needs a receiver to complement the dish and other electronics. Basically, this receiver is an IRD (integrated receiver/decoder), meaning that it takes the scrambled signals picked up from the satellite and decodes them for your viewing pleasure ... providing you have paid your subscription fee.

The big news about the receivers at PRIMESTAR is the massive conversion undertaken to switch all current customers from an analog encoding/decoding system to the new digital technology. The switch to digital allows PRIMESTAR to squeeze more channels into its transponders through the use of new compression (MPEG) technology. This enables PRIMESTAR to more than double the number of channels in its programming lineup, for a total of 77 channels.

Of course, that's good news for the subscribers, but it's only part of the story. The entire upgrade from analog-to digital-based receivers took place over a three-month period last summer. Another impressive fact is that the new equipment was supplied at absolutely no cost to subscribers. PRIMESTAR technicians exchanged nearly 1,000 receivers a day, until every customer was supplied with a new receiver.

All new customers will receive the digital equipment automatically.

The encryption system used by PRIMESTAR is the Digicypher, manufactured by General Instrument, developers of the Videocypher encryption system used by most C-band programmers. The upgrade represents a \$40 million investment for PRIMESTAR. Also in the works is yet another upgrade in 1995, which will allow PRIMESTAR to utilize the coming MPEG-compression digital stan-

dard, a video format and standard accepted by a wide number of multimedia-entertainment producers and consumer equipment manufacturers.

The Channel Lineup

Currently, PRIMESTAR supplies its customers with up to 37 channels, including a selection of premium movie services and pay-per-view channels. The basic service includes several premium services that, on other systems, could cost extra, such as two Disney channels. Sports fans will be pleased with the 15 different regional sports channels, which broadcast hundreds of collegiate and even some major-league games.

Adding Audio

Staying up on the latest in home entertainment, PRIMESTAR also supplies its customers with six CD-quality audio channels. These are like radio stations that you listen to by taking a "line-out" audio signal from your receiver and sending it to your home stereo. But unlike radio stations, this music has *no commercials!* Record to your own digital cassettes and you'll soon have a great selection of uninterrupted music performed by your favorite entertainers.

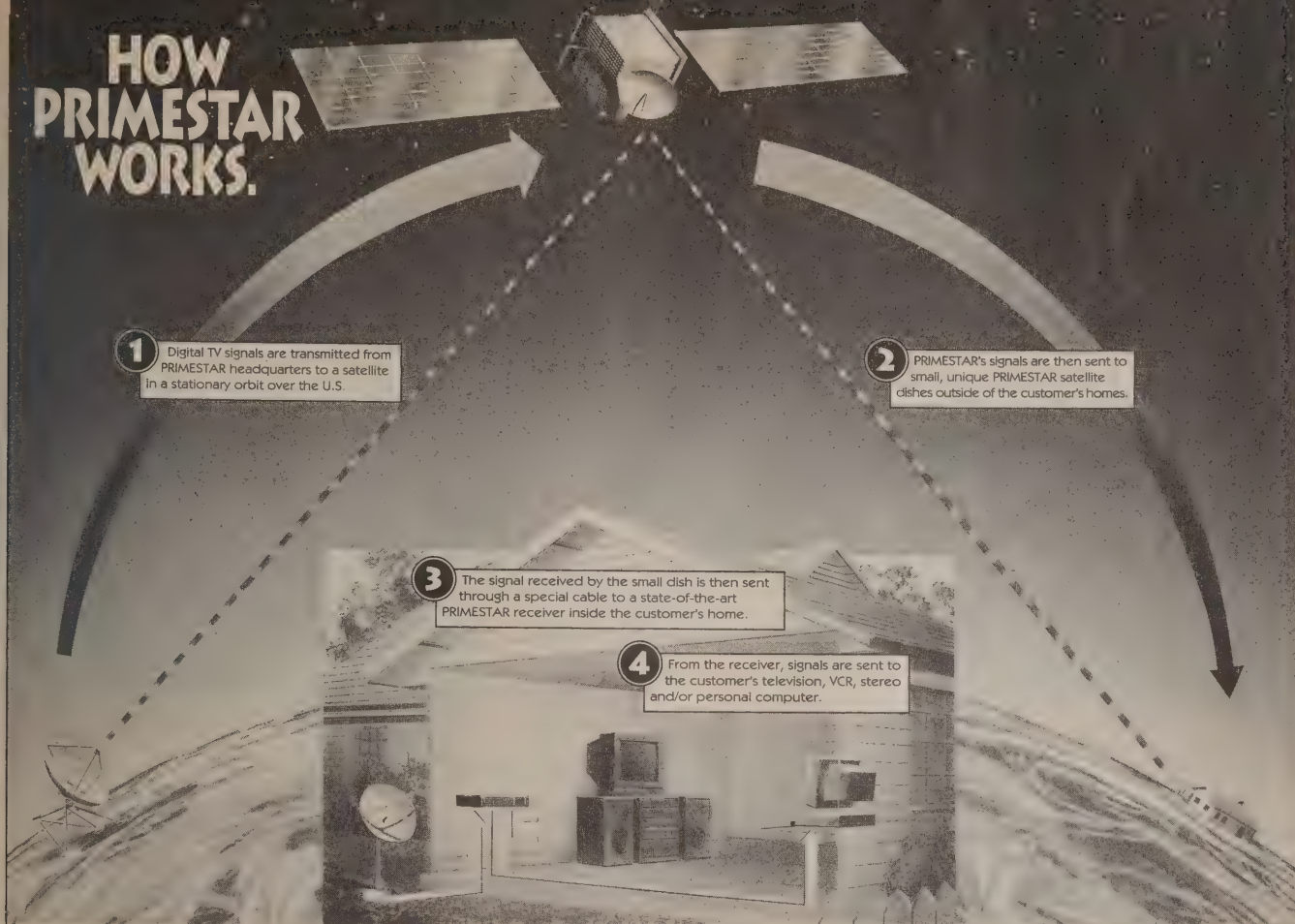
There's something for everybody. Start out with the "Classic Hits" that are as popular today as they were in the Sixties. Then, again, if you are mellowing out a bit, your tastes might lean toward "Light 'N Lively Rock." Look for soothing background melodies? Try "Soft Sounds." Of course, the hot sound today is "America's Country Favorites." For the more sophisticated there is "Classical Collections." Another alternative is "New Age of Jazz."

Here's some of the video lineup:

- The Weather Channel
- USA Network
- TBS
- TNT
- The Learning Channel
- The Family Channel
- The Nashville Network
- Country Music Television
- CNN
- The Sci-Fi Channel
- The Discovery Channel
- The Cartoon Network
- Turner Classic Movies
- Arts & Entertainment
- C-SPAN
- KTVU
- TV Japan
- Liberty Satellite Sports (14 regional sports channels, including Prime Ticket and Madison Square Garden)
- ABC
- NBC
- CBS

Premium options include HBO and Cinemax. There's more on the way, too.

HOW PRIMESTAR WORKS.



Nothing to Buy, Nothing to Maintain

Say what? That's right! PRIMESTAR will supply, at absolutely no cost to new subscribers, all hardware needed for reception. You pay only a small installation fee, along with your monthly subscription rate. The installation fee generally runs from around \$100 to \$300. Subscriptions start at about \$30 a month for the basic service, more if you want to add premium movies or pay-per-view selections.

The idea of PRIMESTAR is that it is "wireless cable," if you will. You are not purchasing a bunch of high-tech hardware that will become obsolete almost as soon as you buy it. You are paying for programming, just like you would from cable. And, like cable, if there is any problem in reception—whether it be a bad component or a dish blown off track by a storm—all maintenance is covered by PRIMESTAR.

In a sense, the PRIMESTAR subscriber is leasing the system. PRIMESTAR still owns the equipment, while the subscriber pays for use of the hardware. You never have to worry about receiving an astronomical bill for repair of a system that gets damaged by lightning or simply wears out. PRIMESTAR accepts the responsibility to keep you supplied with service. You cooperate by maintaining your subscription for years and years.

This is a big dividing line between PRIMESTAR and all other satellite systems and services. C-band home satellite systems (the kind that have been around for so long already) still cost around \$2,000 or more, plus programming fees. Maintenance or replacement of damaged components can easily cost the home dish owner several hundred dollars a pop.

DSS systems carry a price tag of around \$700 or more, plus an installation fee, as well as programming costs. And, after the warranty period expires, you are responsible for your own maintenance and repair costs.

When you consider the real costs, PRIMESTAR starts to look like a pretty good deal!

Expect to hear a lot more about PRIMESTAR. Spending the last few years becoming established, PRIMESTAR has now gone on the offensive. It has launched a very extensive, \$55 million national ad campaign, including huge ads in newspapers and the first television advertising for a satellite service on any of the big three networks. Keep an eye out for PRIMESTAR's attention-grabbing commercial, using fancy computer animation to capture the magic of home satellite television. If hassle-free TV with plenty of choices is what you're looking for, then PRIMESTAR may be the answer. 📡

Bloomberg Direct (BBD) provides continuous coverage of worldwide business and financial news. Bloomberg maintains 40 news bureaus, covers all major trading exchanges and provides breaking news stories live. BBD has regular reports, statistical data and training seminars provided by the U.S. Chamber of Commerce.

NewsWorld International provides news and public-affairs programming from the newsgathering facilities of the Canadian Broadcasting Corporation. TRIO, another Canadian-based programmer, offers a melange of family-oriented entertainment, with an emphasis on drama and the arts. Also from Canada is Much Music, a 24-hour music service featuring rock, pop and rap music videos as well as entertainment and lifestyle coverage with a Canadian flavor ... in short, Canada's answer to MTV.

TV Asia is a specialty channel with daily service from the Indian subcontinent. Among the programs offered are movies, news, sports and drama. This service is available for an extra monthly fee.

In 1995, DIRECTV will begin offering several new services. CNNI, or CNN International, will present 24-hours-a-day international news and special-events programming. Although separate from the Atlanta-based CNN and Headline News, the same Turner Broadcasting commitment to journalistic excellence will be a foundation of CNNI.

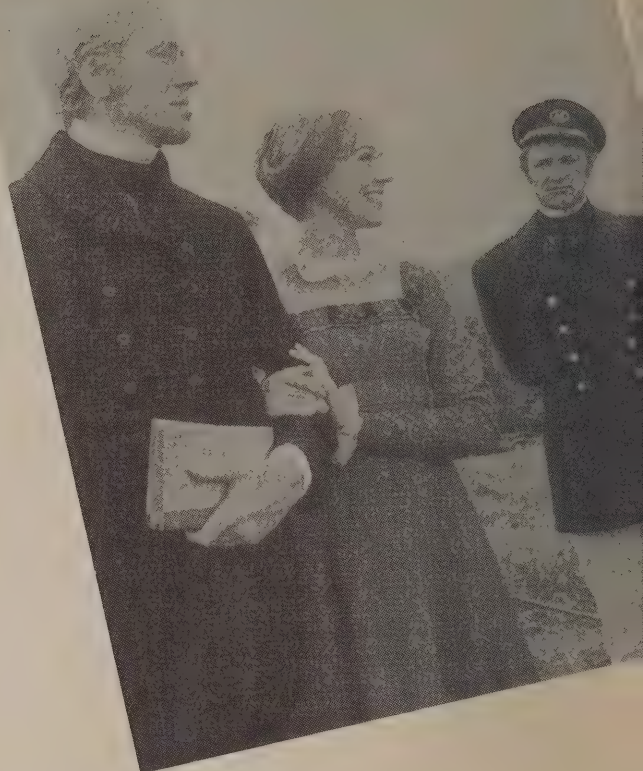
The Golf Channel comes to DIRECTV in 1995, with live and tape-delay coverage of world-class golf tournaments from Europe, Africa and Australia. Another staple of Golf Channel programming will be golf tips, profiles of leading courses and players, and news from the North American golf world.

Other educational services are planned for DIRECTV coverage. Among the more aggressive new startups in this field is continuing education for persons in the medical field. The Physicians TV Network will offer physicians and medical practitioners access to symposia, debates on key medical issues, features on medical specialties and the legal aspects of a medical practice. Continuing-education credit will be available to the medical community. Other such continuing-education programs were in the planning stages at press time.

CD-Quality Music

The 28-channel Music Choice service offers up CD-quality radio channels ... without the commercials! This innovative audio service has several unique formats—literally, something for every musical taste.

- Music Choice 1: Hit List
- Music Choice 2: Dance
- Music Choice 3: Hip Hop
- Music Choice 4: Urban Beat



- Music Choice 5: Reggae
- Music Choice 6: Blues
- Music Choice 7: Jazz
- Music Choice 8: Jazz Plus
- Music Choice 9: Contemporary Jazz
- Music Choice 10: New Age
- Music Choice 11: Eclectic Rock
- Music Choice 12: Modern Rock
- Music Choice 13: Classic Rock
- Music Choice 14: Rock Plus
- Music Choice 15: Metal
- Music Choice 16: Solid-Gold Oldies
- Music Choice 17: Soft Rock
- Music Choice 18: Love Songs
- Music Choice 19: Progressive Country
- Music Choice 20: Contemporary Country
- Music Choice 21: Country Gold
- Music Choice 22: Singers And Standards
- Music Choice 23: Easy Listening
- Music Choice 24: Classical Favorites
- Music Choice 25: Classics In Concert
- Music Choice 26: Contemporary Christian
- Music Choice 27: Gospel
- Music Choice 28: For Kids Only

For USSB—the St. Paul, Minnesota, concern co-operating with DIRECTV to bring the total lineup on the DSS service—scouts are out, in force, looking for narrow-cast, special-interest programming. USSB Vice President Jerry Danziger notes that program development has begun for opera and fine-arts buffs. Another series has been christened which will take many years to produce but, when finished, will offer a unique and interesting service to race horse breeders; this series follows the life of a colts/fillies from birth to early training for their racing careers.



Greater Variety—Unlike cable, there are nearly 150 channels available on DSS at any given time, from two Disney Channel feeds to 28 CD-quality music channels.

With the advent of DIRECTV's 150-channel capacity, many of these channels, as well as other, specialized and newer channels are now available to you when you purchase your dish system. Let's compare what you won't find on cable—at least not

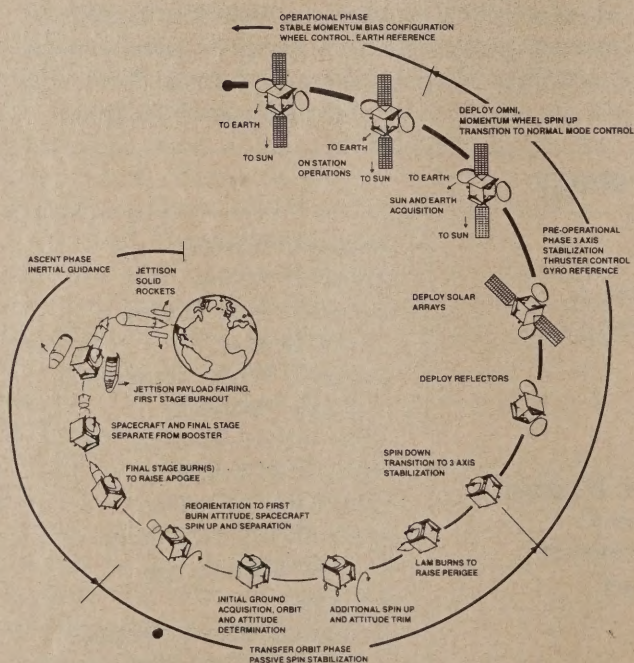
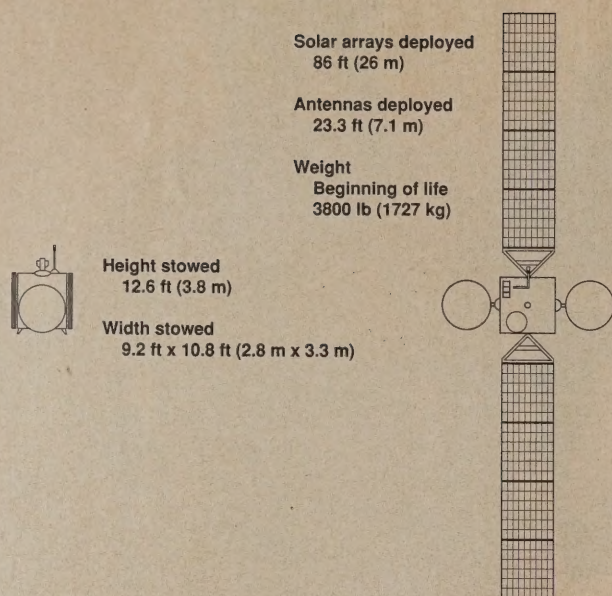
on the majority of systems which have limited channel capacity. For instance, the list below includes 20 channels available on the majority of cables systems *plus* dozens of others not usually found there. The new (to many viewers) channels are highlighted.

Available On DIRECTV

CNN CourtTV Headline News ESPN ESPN/Alternate ESPN2 TNT E! Entertainment Much Music Turner Classic Movies The Disney Channel (East) The Disney Channel (West) The Discovery Channel The Learning Channel Cartoon Network USA Network TRIO The Family Channel	Superstation TBS The Nashville Network Country Music Television Sci-Fi Channel C-SPAN C-SPAN2 Bloomberg Direct Consumer News & Business The Weather Channel NewsWorld International The Travel Channel A&E STARZ! Encore Encore2: Love Stories Encore3: Westerns	Encore4: Mystery Encore5: Action Encore6: True Stories and Drama Encore7: WAM (America's Youth Network) CBS: WRAL/Raleigh, NC NBC: WXIA/Atlanta PBS: KRMA/Denver ABC: WABC/New York Fox: WFLD/Chicago TV Asia 16 regional sports channels for special sporting events Playboy Television Music Choice (28 channels of CD-quality audio)
--	---	--

USSB

All-News Channel VH-1 Lifetime Television Nickelodeon/Nick At Nite MTV FLIX CINEMAX/East	CINEMAX2 CINEMAX/West The Movie Channel/East The Movie Channel/West HBO/East HBO2 HBO3	HBO/West Showtime/East Showtime2 Showtime/West MTV Comedy Central USSB Background Channel
--	---	--



Launching The "Birds" from page 29

Specifications

Each DBS spacecraft measures 23.3 feet (7.1 meters) across with the two transmit antennas deployed, and 86 feet (26 meters) long from the tip of one four-panel solar-array wing to the other. These arrays will generate a combined 4,300 watts of electrical power, backed up by a 32-cell nickel-hydrogen battery for uninterrupted power during solar eclipse. The spacecraft weighs around 3,800 pounds (1,727 kilograms) at the beginning of its life in orbit.

An innovative, graphite antenna system makes its

debut on the DBS spacecraft. The transmit and receive reflectors feature a specially contoured surface which requires only one, rather than multiple, feedhorn to provide an optimal signal. The composite material is so light that each eight-foot-diameter transmit antenna weighs less than 20 pounds. The antennas are aligned in a unified structure to provide a significant improvement in antenna-pointing performance.

The HS 601 body is composed of two main modules. The bus module is the primary structure, which carries launch-vehicle payloads and contains the propulsion, attitude-control and electrical-power subsystems. The payload module is a honeycomb structure containing the payload electronics, telemetry, command and ranging equipment, and the isothermal heat pipes.

Reflectors, antenna feeds and solar arrays mount directly to the primary module, and antenna configurations can be placed on three faces of the bus. Such a modular approach allows work to proceed in parallel, thereby shortening the manufacturing schedule and test time.

The HS 601 satellite line was introduced by HSC in 1987 to meet anticipated requirements for high-power, multiple-payload spacecraft for such applications as direct broadcast, private-business networks and mobile communications. By mid-1993, customers had ordered 29 HS 601 satellites in various configurations.

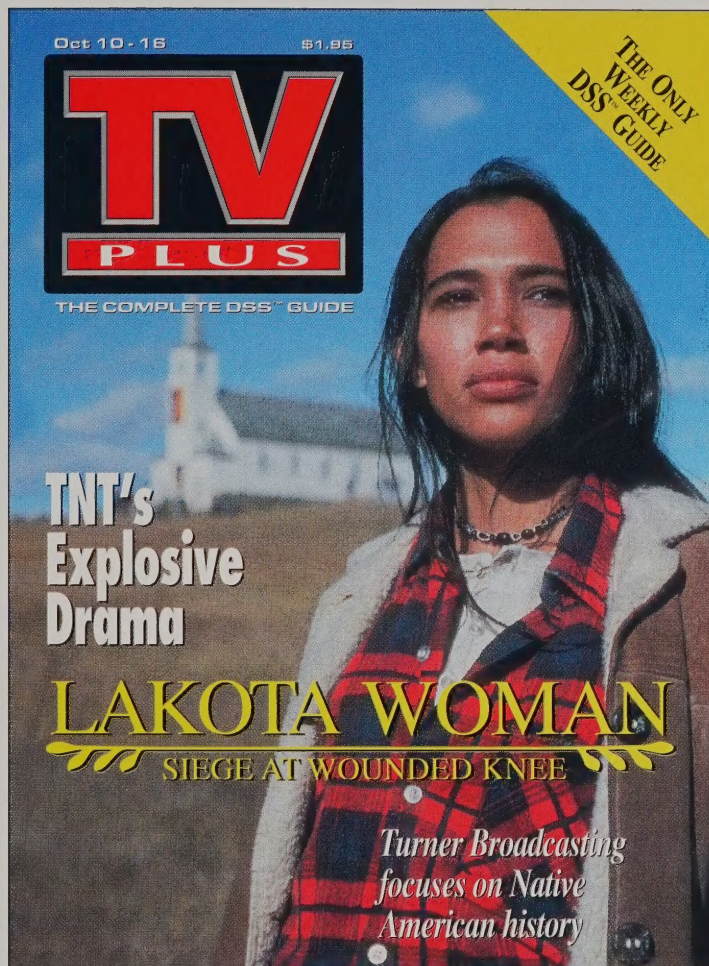
An A/V Revolution

It's easy to become engrossed with the technology of the new DSS system and overlook its true impact. Launching satellites capable of direct home picture and sound reception marks a major new step in communications. Its importance can be compared with the development of wireless communications. At one time, the only way to communicate instantaneously over long distances was via wired telegraph and telephone lines. Then, microwave transmission became possible and wireless transmission revolutionized commercial communication. The same thing is now possible for the home. In the past, the only way to receive a good clear television signal was via wired cable. Now, however, because of DSS, cable has become obsolete. A better signal can be sent directly to your home from space.

Launching the direct-broadcast birds ushers in a new era of communications of which we are only seeing the first byproducts. Yet to come are personal telephones and computers communicating worldwide directly to and from satellites. These are scheduled to arrive in the next 10 years. And you, the public, apparently love it. According to Thomson Consumer Electronics (RCA), the sales of the new DSS system are expected to be higher than even VCRs when they were first introduced in 1977.

When the DSS birds were launched, it was apparently more than just metal and ceramics that went up—it was an entire communications revolution.

TV PLUS



Delivers The Maximum From The Mini Dish

TV Plus, the only weekly guide for subscribers to DSS™, delivers maximum enjoyment from the small dish satellite system. The weekly listings ensure the most accurate and up-to-date guide on the market.

The 18-inch dish is currently sweeping the nation and popularity is growing as it becomes more available. Purchasers and subscribers to DSS programming can receive up to 175 channels of

digital television with accompanying digital stereo sound. *TV Plus* provides background on pay-per-view events, movies, specials, sports, and network shows featured on the new venture. Listings are presented in easy-to-read 24-hour grids, similar to those displayed on the DSS on-screen guide, for an easy interface with the technology.

Get the most out of the mini dish — get *TV Plus*!

To get a free sample copy, call 1-800-884-7077
or contact *TV Plus* at P.O. Box 2384, Shelby, NC 28151-2384.

HEAVEN SENT.

Now you can get so much
great entertainment...it's a miracle!

Just think...MultiChannel HBO® and Cinemax® deliver 8 great programs—*any time you want to watch!* That's 5 HBO services and 3 Cinemax services. You've never had a better choice of TV's best premium entertainment. And what's more, with a DSS system, it comes to you in crystal clear digital audio and video from USSB.

Call 1-800-204-**USSB** today for details.

You know what? Somebody up there likes you.

MultiChannel
HBO
cinemax



A Bronx Tale
HBO-E



Star Trek III:
The Search for Spock
HBO-W



2001:
A Space Odyssey
HBO2-E



Encyclopedia
HBO2-W



Mo' Money
HBO3



Red Rock West
MAX-E



Leap of Faith
MAX-W



Dennis the Menace
MAX2